



## **ANZBIG SUBMISSION: Draft End of Waste Code: Biochar (EOWC010002177)**

**23 October 2023** (per extension granted by DES)  
submitted via email to: [RRS.Consultation@des.qld.gov.au](mailto:RRS.Consultation@des.qld.gov.au)

### **Introduction and Background Comments:**

Thank you for the extended opportunity to provide comments on the draft *End of Waste Code for Biochar* (EOWC010002177) ('draft Code') under the Queensland Waste Reduction and Recycling Act (WRR Act) 2011, submitted on behalf of the ANZ Biochar Industry Group (ANZBIG). ANZBIG is the peak body for the biochar industry in Australia and New Zealand, representing members from individuals through to large multinational corporate organisations. ANZBIG has engaged with allied industries and consulted our membership for comments on the draft Code to inform our submission. We have provided general comments and background below, followed by detailed tabulated comments on the draft Code as requested, with appendices providing supporting information and key references.

Biochar has significant potential to displace fossil carbon used in a wide range of materials and uses across the entire economy in both soil and non-soil/industrial application, and make potentially significant contributions toward national and state decarbonization and circular economy goals, as highlighted within the recently launched [Australian Biochar Industry 2030 Roadmap](#) (ANZBIG, 2023, 'the Roadmap'). It is important that related legislation evolving across Australia regarding biochar and the feedstocks used to make it, appropriately supports the emerging industry whilst maintaining appropriate focus on '*fit-for-purpose*' outcomes for production and use. New legislation should seek to facilitate the safe production, trade, interstate transport and use of biochars as **valuable carbon commodities**. Biochars are valuable products that are rapidly emerging globally, with biochar industry groups and associations now present in many countries that engage with ANZBIG to facilitate knowledge transfer and best practice in production and use of biochar.

The draft Code has potentially national significance by providing a positive precedence for other states who are also considering similar measures such as End of Waste Codes to facilitate improved circular economy. ANZBIG encourages regulators in Queensland DES to work closely with counterparts in other states during drafting and finalisation of the Code to facilitate cross-border harmonisation to benefit emerging carbon commodity markets. ANZBIG supports the primary objective End of Waste Codes to facilitate circular economy by clearly defining the circumstances when something potentially recognised as a waste/excess output from one process becomes a valued **resource** and input to another. For biochar, this has relevance to both the **feedstocks** used to make biochars, and to the **biochar product itself**. Biochars and their feedstocks need to be viewed as valuable resources **best enabled by outcomes-based regulation** using a '*fit-for-purpose*' focus, rather than **prescriptive** regulation. Additionally, it is noted that facilities associated with receiving feedstock resources and the production of biochar to *upcycle* these otherwise wasted resources have historically been (and continue to be) defined and regulated across Australia as '**waste**

*facilities*’ or *‘waste disposal facilities’*, which is a legacy of historical regulatory frameworks originally developed to manage linear *‘take-make-dispose’* economies, rather than for modern circular economies. These aspects also need to be systematically considered and reviewed concurrently with the rest of the scope of this Code to ensure important related factors for the industry also do not become the ‘weakest link in the chain’.

ANZBIG has an existing biochar quality classification and grading system within its **Industry Code of Practice** developed in 2021 which defines **three primary grades (categories) of biochars**. These classifications were specifically designed to help facilitate uptake into soil and non-soil/industrial applications, and include: **Feed Grade** (the premium grade), **Standard Grade** (suitable for use in soil), and **Industrial Grades**. ANZBIG stands ready to work with agencies in all states to further enhance and align its Code of Practice and regulatory End of Waste Codes, which could provide substantial benefits to biochar markets nationally through cross-border regulatory harmonisation.

### **Biochar for Climate Action**

The Queensland Government has set a target of net zero greenhouse gas (GHG) emissions by 2050 (established in 2017). It has also committed to a 30 per cent reduction on 2005 GHG levels by 2030, along with a 50 per cent renewable energy target by that date. Similar climate goals are being set by other states and in many local government areas. Negative Emissions Technologies (NETs) provide Carbon Dioxide Removal (CDR), which includes biochar systems that pyrolyse biomass into solid carbon specifically for uses that are durable in the long term. In 2019 the International Panel on Climate Change (IPCC) advised the world that reducing new emissions (emissions reduction) alone is no longer sufficient to limit warming to 1.5 degrees, and CO<sub>2</sub> removal via NETs such as biochar is now urgently required **at scale**. For this reason, it is important the draft Code provides clarity in the definition of **biochars**. If the same carbon product is alternatively used for **non-durable** uses (in regards to carbon sequestration), these are typically called conventional **charcoals** or **biocarbons** (refer **Appendix 2**). Biocarbons can also provide other important climate benefits by avoiding or reducing new GHG emissions (e.g. steel making by displacing metallurgical coal), but they do not remove existing CO<sub>2</sub> from the atmosphere. Accordingly, these separate definitions can help to track performance against both Emissions Reduction (new emissions) and CO<sub>2</sub> Removal required toward genuine net zero. ANZBIG has provided detailed comments accordingly within our submission.

As detailed further within the Australian Biochar Industry 2030 Roadmap, recent estimates indicate that *globally* biochar could mitigate up to 6.6 billion tonnes of CO<sub>2e</sub> every year by 2050. This is indicatively equivalent to the USA’s entire annual GHG emissions. In Australia, over 50 million tonnes of biomass is currently underutilised being burned, landfilled or otherwise wasted. The biochar industry has the potential to upcycle these under-utilised materials with multiple co-benefits, including removing CO<sub>2</sub> estimated equivalent of up to 10-15% of annual national GHG emissions.

Professor Ross Garnaut, ANZBIG’s Patron, provided the following Foreword to the [ANZ Biochar Industry 2030 Roadmap](#):

*“Better utilisation of currently wasted and residual biomass resources for biochar production can provide valuable inputs into agriculture and industry. In agriculture, biochar can improve soil fertility and increase moisture retention. Fed to cattle or sheep, biochar can improve digestion so that more feed is converted into increased meat, milk and other animal products, and less methane is released. In industry, biochar can provide a renewable source of inputs that would otherwise be drawn from coal, oil or gas and contribute to carbon emissions. It can contribute this value while capturing and storing for long periods the carbon*

*that has been absorbed from the atmosphere by plants. The long-term storage of carbon as biochar is recognised as a secure source of negative emissions. The Australian Biochar Industry 2030 Roadmap comes at an important time, when we need to lower emissions quickly, and to develop new sources of economic growth. The production of the Roadmap is a tribute to ANZBIG, the peak body of the growing biochar industry.*

*The Roadmap embodies the results of extensive participant consultation. This not-for-profit group has attracted members and supporters from biochar producers, biochar users, capital providers, research scientists, engineers, and citizens with an interest in climate change action. ANZBIG's Roadmap will inform the community and illuminate the case for new policies from all Australian governments. ANZBIG's Roadmap will inform the community and illuminate the case for new policies from all Australian governments. ANZBIG's Roadmap is especially timely. The 2020s are the critical decade in which people with influence now will take decisive steps towards stopping the trend to higher global temperatures, or leave future generations with an impossible task. Australia has the resources to strengthen its economy through developing net zero targets, while removing its own emissions and contributing substantially to net zero emissions in the rest of the world. Biochar can make significant additions to these important outcomes in the years to 2030, and much more after that. The ANZBIG Roadmap demonstrates the contribution biochar can make to Australian economic and environmental goals. Community understanding of the Roadmap will drive removal of barriers to increased development of this new industry. High levels of investment will follow the introduction of policies that recognise the value of innovation in a burgeoning industry that has potential for large expansion, and the value of removing carbon dioxide from the atmosphere. I look forward to working with you in making progress in the directions defined by the Roadmap. And I look forward to the biochar industry making a major contribution to the emergence of Australia as a Superpower of the net zero world economy. "*

***Professor Ross Garnaut AC, Patron of ANZBIG, May 2023***

**Our detailed comments on the Code are provided in the table on the following pages below.** A list of Appendices supporting our submission is provided following the tabulated comments.

We thank the DES for the extended opportunity to provide these comments and would welcome further engagement in progressing this important and positive document. If you have any queries at all or require further clarification, please do not hesitate to contact ANZBIG via CEO Don Coyne, who will relay it to the appropriate people within our Board and our membership to respond.

Kind regards,

**Don Coyne**

Chief Executive Officer, ANZBIG

**Craig Bagnall** BE (Env), CEnvP (IA Specialist)

Executive Board, Technical Advisory Board ANZBIG  
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Visiting Professor (VP) and Web of Science highly cited researcher School Material Science and Engineering, University NSW VP at University of Wollongong, New England University, Nanjing Agricultural University, Griffith University. Honorary Professor Deakin University.

**ANZBIG Working Group Members**

Duncan Le Good - Executive GM Product Sales & innovation, SoilCo

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**On behalf of:**

**ANZ Biochar Industry Group (ANZBIG)**

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## Detailed Comments:

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
GENERAL COMMENTS	Not started	<p><b>General Comments:</b></p> <ul style="list-style-type: none"> <li>● The proposed EOW code for biochar provides a positive foundational framework for regulating biochar production and use, however the draft code requires further development including acknowledgement of the diverse range of soil and non-soil uses for biochar, well beyond agricultural soil applications alone. An outcomes-based approach is required which is also <b>adaptive and flexible</b> to accommodate the rapidly evolving nature of biochar applications, research and development, production technologies, and market needs.</li> <li>● <b>ANZBIG advocates for a balanced framework that optimises regulatory resourcing burdens for both the DES and for the industry, and for sufficient government resourcing and staffing be deployed (and sustained) to enact the new framework efficiently.</b> It is vital that a productive and practical approvals framework is achieved and resourced to provide confidence for significant investment in the industry, whilst balancing appropriate regulatory needs.</li> <li>● ANZBIG recommends the title of the Code be modified to <b><i>EOW Code for Biochar and Other Biocarbons</i></b>. This is important due to the definitions of these detailed in our comments on <b>Section 4</b> of the Code. This enables the Code to still cover the same carbon (produced by the same facilities) being used in <i>different applications</i> which technically apply to those definitions.</li> <li>● <b>Biochar has numerous uses in soil and non-soil/industrial applications as detailed in Appendix 2. Allowance should be made in the Code to recognise and accommodate existing industry-specific quality standards</b> (e.g. fertilisers, composts/soil conditioners, biosolids, and construction or industrial purposes).</li> <li>● The properties of commercial biochars are typically customised to meet the specific requirements of their intended application (outcomes focused). Biochar properties alter with feedstock, processing conditions and pre/post treatments, including additives and co-feedstocks. <ul style="list-style-type: none"> <li>○ <b>For the above reasons (variables), an outcomes-based approach to regulation</b> would be highly beneficial, using a focus on <b><i>‘fit for purpose’ characteristics for intended use(s) in soil and non-soil / industrial applications</i></b>, including animal feed applications requiring premium grade</li> </ul> </li> </ul>	

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
		<p>biochars.</p> <ul style="list-style-type: none"> <li>○ Where <b>prescriptive</b> regulation text is to remain in the Code, it is important that flexibility and adaptability be provided through inclusion of wording such as “<b>...unless otherwise approved by the Department</b>” or similar. This provides ability for justified feedstocks/projects and uses to be permitted where appropriate. However, prescriptive regulation also has the potential to result in significant and costly (time and \$) additional regulatory burden on the department and the industry which is undesirable and potentially avoidable through alternative use of outcomes-based regulation.</li> <li>○ <b>Regulation to control both production and use should be proportionate to <i>scale and risk</i>.</b> The current code does not adequately provide for the wide range of scale in both production and use of biochars from very small scale flame-capped kilns (‘Kon Tiki-style’) commonly used by individuals and small organisations, through to large commercial and industrial scale pyrolysis and gasification systems; from minor/individual onsite users of biochar through to industrial scale users and applications; and from individual localised targeted application through to broad-acre application across large areas of land. It is noted that even small scale / low tech biochar systems can provide substantial improvements in managing biomass residues than the common “<i>Business as Usual</i>” management methods of ‘burning-off’ via open combustion, including the associated health and other impacts from smoke and particulates. ANZBIG would welcome further engagement with DES on potential measures to appropriately manage various scales of biochar production.</li> <li>○ <b>The sole use of total concentrations alone for regulating use of biochars in the nominated soil uses is inappropriate and will likely inhibit both use and intended outcomes.</b> Whilst the use of total concentrations can provide preliminary screening, <b>pathways for secondary investigations should also be provided which achieve the same required outcome</b> (e.g. protection of agricultural soil systems etc). Such approaches are commonly used by other guidelines across Australia and internationally where other important contributing factors are also considered, such as <b>leachability and bioavailability</b> for example, as well as other factors relevant to each application detailed further in our comments in Section 6 (e.g. maintaining soil balances to</li> </ul>	

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		<p>sustain agronomic crop requirements). A balanced and <i>systematic</i> approach to use of soil ameliorants can facilitate the required outcomes to remedy this. These would typically involve <i>load-based</i> assessment as a minimum, rather than just consideration of concentration alone.</p> <ul style="list-style-type: none"> <li>○ The above can also apply to the variance in different <i>soil uses</i> too for biochars - for example many other types of soil applications also exist which are inhibited by the current prescriptive regulation of the draft Code. For example, <b>agricultural soil remediation</b> such as <i>interception trenches</i> for nitrate and pesticides/herbicides runoff such as Queensland banana farms to prevent potential impact to the Great Barrier Reef; and many commercial and industrial soil applications such as <b>contaminated site remediation</b> (sorbing hydrocarbons, PFAS and metals for example) among many others as illustrated in <b>Appendix 2</b> to this submission.</li> <li>○ <b>Conversely</b>, the requirement for expert agronomic advice (e.g. application rates) for the currently nominated feeds/applications in the draft Code may not provide the desired outcome, being <b>unwarranted for small scale use/risk</b> where such a requirement is likely to unduly inhibit the market compared to alternatives (such as monitoring and quality control system to achieve the same desired outcome, complemented by a ‘trigger’ threshold requiring such).</li> <li>○ The above has particular relevance to Section 6.3 of the existing draft Code as detailed further within this submission.</li> <li>● How does the DES currently intend to administer the Code for <b>imported biochars</b>? This is a critical consideration to facilitate equality for the emerging local biochar industry, noting that imported biochars are <i>already</i> on retail hardware shelves with no/limited QA understanding including feedstock <b>sustainability</b>. Accordingly, <b>imported chars must be subject to the Code too</b>. ANZBIG has proudly developed its own industry <a href="#">Code of Practice</a> (2021) which includes <b>feedstock sustainability</b>, which is a critical consideration as the industry emerges globally.</li> <li>● Consideration of <b>sustainability</b> and <b>Higher Order Use</b> when producing and using biochars should be included in the Code. This should encourage sustainable use of resources (both feedstocks and biochar product) in line with both the Waste Hierarchy and the more recent UN Sustainable Development Goals (SDGs).</li> </ul>	

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
<b>SECTION 1: EXPLANATORY STATEMENT</b>			
1. Explanatory Statement	Not started	<p><u>Issues/Recommendations Raised:</u></p> <ul style="list-style-type: none"> <li>• Inclusion of text outlining how biochar and the EOW Code could be expected to contribute to meeting multiple policy objectives for Queensland (and Nationally) would be informative for all readers. <b>Inclusion of specific regulatory objectives is recommended.</b></li> <li>• <b>It is recommended that producers be required to refrain from representing <u>code compliance as product endorsement</u>, they are very different issues. <i>Statements of limitation</i> are considered appropriate and recommended.</b></li> <li>• Inclusion of brief notes informing readers (particularly users) about the broad range of biochars available and their characteristics is recommended. Biochars <b>(plural)</b> are a <i>collective description</i> - a broad range of biochar carbon products are available to fit the corresponding broad range of carbon characteristics required by various markets in both soil and non-soil / industrial applications across multiple sectors of the economy. This Code should seek to facilitate safe production and use in all of these.</li> </ul>	
<b>SECTION 2: GUIDANCE</b>			
2.3 Failure to comply	Not started	<p><i>“Please refer to <b>Appendix A of this EOW code for general obligations for all persons operating under this EOW code, which includes the resource users.</b>”</i></p> <p><b>Appendix A: “Failure to comply with EOW code (section 158) - A registered resource producer for an EOW code must not use, sell or give away the resource unless the registered resource producer complies with the requirements of the EOW code relating to the resource. A person, other than a registered resource producer, must not use a resource in a way, <u>or for a purpose, that does not comply with an EOW code for the resource.</u>”</b></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>• Appendix A effectively requires complete compliance with <b>all conditions</b> of the Code and captures <b>all producers and users/applications regardless of scale and magnitude unless otherwise specifically excluded</b> in parts of the Code (which are currently insufficient). This further highlights issues raised in</li> </ul>	

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		<p>our submission further below (including Section 6) for the need to provide a suitable framework that is <b>proportionate to the scale of activity and</b> for the <b>associated risks</b> of harm to people and/or the environment.</p> <ul style="list-style-type: none"> <li>● <b>Currently, all scales of production and use are regulated the same under the Code unless excluded (with no thresholds etc), and with disproportionate risks to people and the environment</b> (e.g. no variance by type of application such as industrial uses compared to agricultural food systems). Testing, reporting, recording and notification systems (among other regulatory matters covered by the Code) need to be proportionate to scale and risk.</li> </ul>	

#### SECTION 4: WASTE TO WHICH THIS EOW CODE APPLIES

4. Waste to which this EOW code applies	Not started	<p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● The definition of <b>'Biochars'</b> requires further clarification, per our comments provided separately for the <b>Definitions</b> section of the Code (see toward the end of this table). The <i>use</i> of biochar specifically in applications that provide <b>durable carbon sequestration</b> is a key definition point of difference. Other <b>charcoals / biocarbons</b> can also be made in oxygen-limited environments BUT are used for combustion or oxidative uses. These do not provide durable sequestration, but do play an important role in climate action for emissions reduction by displacing fossil carbon (e.g. displacing metallurgical coal in steel making). <b>All of these need to be included and managed under the scope of this Code</b>, as all can use the same carbon from the same production facilities (just in different applications), and all have a critical role to play in circular economy and climate action.</li> <li>● Accordingly, the title of Code itself should be revised to <b>'EOW Code for Biochars and Other Biocarbons'</b>.</li> </ul>	
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#### SECTION 5: PERSON TO WHOM THIS EOW CODE APPLIES

5.1 Registered resource	Not started	Refer to comments submitted on <b>Section 6</b> .	
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Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
producers of the resource			
5.2 Resource users	Not started	Refer comments submitted on <b>Section 7</b> .	
<b>SECTION 6 - REGISTERED RESOURCE PRODUCER REQUIREMENTS</b>			
6. Registered Resource Producer Requirements	Not started	<p><u>Additional comments on Section 6 (further to the specific subsections below):</u></p> <ul style="list-style-type: none"> <li>Are <b>interstate and overseas producers</b> of biochar also regulated by these requirements in this section? (i.e. producers sending biochar products <b>into</b> Queensland). Does this scope also include important <b>wholesalers/retailers of carbon commodities</b> (both within Queensland and beyond)? Will these parties also need to be registered and comply? This has significant implications for interstate regulatory harmonisation aspects to enable biochar as a valuable bulk commodity to be easily traded <u>nationally</u>.</li> </ul>	
6.1. Registration under this EOW code	Not started	<p>Page 6 s6.1: <i>“Prior to operating under this EOW code, the <b>producer of the resource must register with the chief executive by giving a notice in the approved form3 to become a registered resource producer for this EOW code</b>”.</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>This condition appears to currently apply to <b>all</b> producers of all sizes and scales unless specifically excluded, including <b>non-commercial</b> producers? (e.g. even hobby farms etc?). This could capture minor producers including <b>indigenous groups</b> who want to make and use biochar on their own properties to manage their lands. <b>The inclusion of a trigger threshold (or similar effect) and exclusions for minor producers and minor use is warranted and recommended.</b></li> </ul>	ANZBIG would welcome further discussion on this to appropriately regulate different scales of production and use.

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6.3 Approved Resource (6.3b)	Not started	<p><b>Page 6 s6.3:</b> <i>“The registered resource <b>producer</b> must <b>not use, sell or give away</b> the resource under this EOW code <b>unless</b> the resource <b>complies with all</b> the <b>following criteria and quality characteristics:</b>”</i></p> <p><b>Section 6.3b):</b> <i>“If the biochar is produced <b>using digestate, food waste, food processing waste and/or biosolids as feedstock</b>, the biochar must not exceed the quality criteria stated in <b>Table 1: Resource quality criteria</b>; “</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● <b>ANZBIG supports outcomes-focused ‘fit-for-purpose’ regulation</b>, and supports regulation which is <b>proportionate to scale and risk</b>.</li> <li>● The draft Code currently does not currently provide differentiation for applications (soil and non-soil/industrial uses) and the required qualities for those. Separate <b>‘fit-for-purpose’</b> criteria are required for agricultural soil applications compared to other soil applications (e.g. adsorbent chars for remediation) and non-soil/industrial applications. Allowance should also be made within the Code for recognition of <b>existing</b> industry specific quality standards in all uses of carbon in circular economy. Further comments are made on particular examples below for fertilisers, composts and biosolids.</li> <li>● The ANZBIG <b>Code of Practice</b> (refer <b>Appendix 4</b>) provides quality grading classifications for <b>Industrial, Standard and Feed Grade biochars</b> (the latter is not allowed when made from certain feedstocks in line with established feed legislation in many states). Standard Grade and Feed Grade quality are deemed fit for soil applications, including agriculture. It is highly recommended the draft Code consider inclusion of these classification categories. <b>ANZBIG would welcome further engagement with DES on how the ANZBIG COP’s categories and classification values were derived (which also differ to the draft Code), and the secondary processes the ANZBIG COP also provides where initial primary screening using total concentrations is triggered</b>, subsequently requiring further investigations to ensure a biochar is fit for purpose (particularly in soils).</li> <li>● Critically, <b>“Fertiliser”</b> and <b>“Compost”</b> in Australia have well established national and state legislation and/or guidance for their definition, production and use. These include <b>Australian Standard 4454 for Composts</b> and the <b>Queensland Code of Practice for the Naming and Describing of Fertilisers and for the Levels of Contaminants in Fertilisers</b> set by <a href="#">Schedule 2</a> of the <b>Qld Biosecurity Regulation 2016</b>, and</li> </ul>	

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		<p>the <b>Queensland End of Waste Code for Biosolids</b> (relevant specifically where biochars are made from those biosolids).</p> <ul style="list-style-type: none"> <li>○ <b>If a biochar or biochar-based product meets the definitions and requirements of existing recognised standards</b> (such as AS4454, the Qld Code of Practice for Fertiliser, or the EOW Code for Biosolids), <b>then the draft Code (for biochar) should recognise the product as approved for use for those specific uses in accordance with those existing standards, with no further requirements (i.e. provide the same path and process to market as for those established standards)</b>. The process should also allow biochar producers who sell product specifically as inputs into production of fertiliser or compost products by other manufacturers to those established standards to do so to those existing standards.</li> <li>○ The Code should be amended with a condition(s) to facilitate the above.</li> <li>● It is also noted that the industry <b>National Code of Practice for Fertilisers</b> (<i>Fertilizer Australia, 2018</i>) establishes ‘<i>minimum trigger levels</i>’ for impurities whereby labelling must include a warning statement where those are exceeded. This is also considered prudent and is encouraged also for biochars used in fertilisers. The ANZBIG Code of Practice also includes labelling requirements for biochars which should also be considered by the Code.</li> <li>● Table 1 currently contains some parameters not reasonably expected to be of concern in biochars from most feedstocks. ‘Clean’ feeds for biochar and bioenergy presenting low/er potential for environmental harm have been recognised in many jurisdictions globally, including Australia (for example ‘<i>Eligible Waste Fuels</i>’ recognised the NSW EPA). <b>Appropriate provision should be included in the Code to recognise differences in risk and related testing requirements. A standard suite of tests should be used for all biochars, complemented by additional testing requirements for additional parameters considered more likely to be present in certain feeds.</b></li> <li>● <b>Heavy Metals (HM):</b> <ul style="list-style-type: none"> <li>○ <b>The draft Code is currently inconsistent and more stringent for total heavy metals (HM) than the criteria described in key national and state guidelines for other soil amendments</b> (as noted further below in regards to biosolids, and earlier above in regards to fertilisers and composts).</li> </ul> </li> </ul>	<p><i>Heavy Metals:</i> There are other important factors in addition to total concentration which should be considered through a secondary pathway that requires further investigation when triggered. For example bioavailability / leachability, application rates and frequencies, receiving soil characteristics (type, pH, and HM contents / deficiencies), agronomic system needs/balance, total annual and cumulative loading etc. <b>Failure to consider these systematically can cause</b></p>

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		<p><b>This is despite biochar typically having higher binding affinity and lower leaching and bioavailability</b> as discussed below and detailed in <b>Appendix 3</b>.</p> <ul style="list-style-type: none"> <li>○ The draft code currently requires highly prescriptive limits on <b>total metal concentrations</b> in biochar (e.g. stricter than the QLD Biosolids End of Waste Code Grade C biosolids limits, and EPA Victoria 943 Guideline C2 grade biosolids requirements). This is despite biochars typically having <b>lower</b> leachability and bioavailability of metals than their parent feedstocks including biosolids as discussed below. It is arguable that development of increased trigger investigation levels for screening total metals in biochars is justified (refer <b>Appendix 3</b>), and ANZBIG welcomes further engagement with DES on this.</li> <li>○ The <b>sole use of total metals criteria alone in isolation of other critical factors to assess risk is not considered appropriate to best determine if a biochar is fit for purpose in soil applications</b> (refer further comments). <b>Combined assessment processes are recommended</b> which use total metals initially for preliminary screening (i.e. trigger levels) to require further investigation, <b>supported by pathways for appropriate secondary testing and investigation to demonstrate a material is safe and fit for purpose</b> (outcomes-based). Some examples where such approaches have been undertaken include for biosolids guidelines throughout Australia (including the Queensland EOW Code), in the USA (e.g. USEPA 1993), solid waste classification guidelines (e.g. NSW EPA), the ANZECC Water Quality Guidelines for Fresh and Marine Waters 2000 (which provides a heavy metals risk decision tree); and the <i>ANZBIG Code of Practice</i> (2021) for biochar characterisation and classification. All of these processes provide trigger levels for total metals supported by pathways for further secondary investigations, which at minimum consider dissolved metals/bioavailability.</li> <li>○ Unlike most soil ameliorants (including fertilisers and biosolids), Biochars are well-documented to provide the additional benefit of <b>binding HMs</b> and <b>reducing bioavailability</b> (see comments column and details in <b>Appendix 3</b>). As noted above ANZBIG supports the use of trigger investigation levels (TIL) for HM quality to require secondary assessment where required, including expert advice on application only in cases of <b>very high use</b> (volume and frequency). However, <b>given the recognised nature of biochars to bind HMs and ameliorate existing</b></li> </ul>	<p>soil, crop and animal deficiencies which can significant impact agricultural production. For example, trace elements such as copper are needed by crops and are now being found deficient in certain soils and agricultural systems as discussed further in these references from <a href="#">WA Department of Agriculture</a> and <a href="#">Meat and Livestock Australia</a>, among others.</p> <p><b>Many studies have shown that biochar can reduce uptake of heavy metal(loid)s by plants</b> (refer <i>Appendix 3a, Section 2.2.3</i>). <b>A meta-analysis found biochar addition to soils resulted in average decreases in plant tissue concentrations of Cd, Pb, Cu, and Zn by 38%, 39%, 25%, and 17%, respectively</b> (Chen et al., 2018). Notably, such studies showing</p>

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		<p>receiving soil HM levels, it is arguable that trigger investigation levels for biochars should be <b>higher</b> than for conventional soil ameliorants. ANZBIG contends that typical loadings for biochar in soil applications results in negligible cumulative change to soil HM levels over time (refer Appendix 3). ANZBIG would welcome further discussion on this with DES.</p> <ul style="list-style-type: none"> <li>○ <b>Technical Guidance for load-based / rate-based application of biochars could be developed</b> to help users and regulation (similar to the approach developed for biosolids but recognising the higher binding affinity and lower bioavailability among other factors), as identified within the Australian Biochar industry 2030 Roadmap.</li> <li>○ <b>Appendix 3</b> provides further information on the binding of heavy metals in biochars via meta analysis of extensive research. Further detailed/specific information can also be provided upon request if required.</li> </ul> <ul style="list-style-type: none"> <li>● <b>PFAS</b> <ul style="list-style-type: none"> <li>○ The PFAS criteria for biochar (<u>non detectable</u>) is inconsistent with the national standards, for example the Draft PFAS National Environmental Management Plan (NEMP) v3 which specifies a threshold for restricted land application of 6.2 µg/kg for PFOS+PFHxS and 25 µg/kg for PFOA (Margin of Safety of 5). The proposed concentration is also significantly out of line with the current national IChEMS process which is stating a concentration of 25µg/kg for the main three PFAS (PFOS, PFOA, PFHxS), and a total concentration of 1 mg/kg for PFAS that can turn into the main three PFAS, for any product. The units given for detection limit (0.002 µg/L) are also unsuitable for a solid product (mg/kg).</li> </ul> </li> <li>● <b>Other Parameters, Impurities and Characteristics:</b> <ul style="list-style-type: none"> <li>○ The table should be checked consistent with other established relevant standards for both the feedstocks used (digestates, biosolids etc) and for other soil amendments. For one example, the limits in Table 1 proposed for organochlorine pesticides and PCBs are significantly lower than both the QLD Biosolids End of Waste Code Grade C biosolids and EPA Victoria 943 Guideline C2 grade biosolids requirements, i.e. 0.02 vs 0.5 mg/kg for organochlorine pesticides and &lt;0.1 vs 1 mg/kg for PCBs for these other standards.</li> <li>○ To ensure that testing parameters also confirm the <i>definition</i> of biochar as per our comments on</li> </ul> </li> </ul>	<p>significant reduction in bioavailability of heavy metals have often also applied high rates of biochar, in excess of 10 t/ha (Chen et al., 2018; Wang et al., 2020). Even feedstocks that contain high contents of heavy metals can reduce the bioavailability of some heavy metals in some soils. For example, sewage sludge biochar decreased the bioaccumulation of As, Cr, Co, Cu, Ni, and Pb, but increased that of Cd and Zn in an <i>acidic</i> paddy soil (Khan et al., 2013). Biochars can increase mobility of some anionic metalloids (e.g As species) but can also be engineered to increase anion exchange capacity (AEC) to adsorb these (e.g. by adding magnetic nanoparticles). ie Biochars can often be modified to address constraints if/where present. An</p>

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		<p>the Definition section (see bottom of this table) and with the ANZBIG Code of Practice, ANZBIG advocates that <b>all commercial biochars</b> (including blends or co-processed chars) <b>should be tested for organic carbon content</b> and for <b>H:C<sub>org</sub> ratio</b> (hydrogen to organic carbon).</p> <ul style="list-style-type: none"> <li>○ The ANZBIG Code of Practice (COP) includes a range of key parameters and characteristics considered important for biochars. In particular, Section 5 of the COP should be referenced for further consideration. ANZBIG would welcome further engagement on this if/where considered for the Code.</li> <li>○ The Code could consider inclusion of commentary that additional tests can and should be considered for specific objectives, including those not directly relevant to biochar quality as a <i>commodity</i> but important for other values (e.g. tests for biochar long term stability needed for carbon credits trading). The intention of such text would be to clarify that Table 1 is not intended as an exhaustive list of all <i>beneficial</i> testing parameters for biochars that can be considered by both producers and users, but rather is focused specifically on minimum testing needs for quality <i>compliance</i>. Such wording would complement a ‘fit for purpose’ approach to the Code.</li> </ul>	<p>outcomes-based regulatory pathway to facilitate biochars to be modified to be fit for purpose through such actions is also encouraged within the Code. Given the findings of the scientific meta analyses now available (including those in Appendix 3), <b>higher trigger investigation levels for total metals in biochars is considered warranted</b> and will be considered by ANZBIG in revision processes commencing for the Code of Practice.</p>
6.3 Approved Resource (6.3c)	Not started	<p><b>Section 6.3c): “only the following materials are used as feedstocks for the biochar: Biosolids, digestate, organic material from agricultural production and livestock production, green waste food waste and food processing waste and cardboard and paper waste.”</b></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● The current list of feedstocks is far too restrictive to enable the potential benefits outlined in the Biochar Industry Roadmap to assist circular economy across all economic sectors. Multiple additional feedstocks are currently missing which significantly inhibits the potential of the Code to facilitate circular economy.</li> <li>● Many additional biomass feedstocks exist (both with and without impurities) which are currently being wasted/underutilised and burned or sent to landfill (for example agricultural and forestry residues</li> </ul>	<ul style="list-style-type: none"> <li>● Different quality standards for biochars used in non-soil / industrial uses (e.g. roads, concrete, batteries, bioplastics etc) should apply compared to those used for feeds and soil applications for</li> </ul>

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		<p>among many many others, the former being of key relevance and importance to Queensland as the national leader in the bioeconomy).</p> <ul style="list-style-type: none"> <li>● Improvements and clarifications for associated feedstock definitions are also required (refer comments column for further details for <i>greenwaste</i> and <i>biosolids</i> for example). <ul style="list-style-type: none"> <li>○ Clarification is required that '<b>green waste</b>' includes <b>invasive weeds</b>, including those sourced from both on public and private owned land (albeit may require additional handling requirements). The biochar industry has significant potential to assist governments and the community to manage invasive species effectively and wording within the code should seek to appropriately facilitate this.</li> <li>○ Clarification is required that <b>biosolids</b> includes <b>all</b> forms of agricultural and municipal biosolids, <b>including raw sludges</b> (primary sludge) <b>and waste activated sludges</b>.</li> </ul> </li> <li>● There are many other soil and non-soil/industrial uses (in particular) which can be appropriately and safely enabled as outlined in <b>Appendix 2</b>. A classification system such as the ANZBIG Code of Practice (Appendix 4) could be used to appropriately direct biochars into appropriate fit for purpose uses. <b>Use of more prescriptive approaches can create unwanted outcomes and missed opportunities unless regularly, rapidly and easily updated (which is rarely possible in regulative processes). This is important when needing rapid action on climate change and diversion of wasted resources from landfill to meet critical targets.</b></li> </ul> <p><b>Key Recommendation: The Code should adopt an outcome-focused approach and develop classification systems for <i>fit-for-purpose</i> pathways for uses of biochars in all soil and non-soil/industrial applications, as long as the producers can demonstrate the environment risks are properly managed.</b> The ANZBIG Code of Practice provides an example of such an approach which could be considered and built upon for the draft Code. ANZBIG would welcome further discussions with DES to assist appropriate inclusion of feedstocks and matching fit-for-purpose applications under the Code.</p> <p><b>Associated consideration of <i>sustainability</i> for <u>all</u> feedstocks should be included within the Code to ensure sustainable use of resources.</b> Note: The 'Waste Hierarchy' commonly used to direct sustainable use of resources</p>	<p>growing food. Other quality standards are warranted for non-food soil applications such as remediation and sporting fields/golf courses (ie sensitive vs other land uses). Risk-based approaches can facilitate improved outcomes for genuine circular economy combined with climate action. Outcomes-based regulation requiring '<b>fit for purpose</b>' <b>quality standards</b> for biochars produced from all types of feedstocks can facilitate this, providing flexibility for feedstocks whilst maintaining quality and risk management for people and the environment in their subsequent application.</p>

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		<p>is aging and does not currently include a number of critical considerations for modern environmental challenges (e.g. climate change, water/food security, resilience, social aspects etc). Measurable sustainability reporting and assessment mechanisms should also be considered (e.g. the UN SDGs or similar).</p> <p>A number of biochar-related standards exist globally (including those associated with carbon crediting systems) which identify approved lists of appropriate feedstocks for various types of biochars which could be cross-checked and considered for the Code (e.g. EBC, IBI, Climate Action Reserve etc). This could assist alignment of carbon crediting benefits to enhance biochar commodity markets. Additionally, other States within Australia also have existing nominated lists of feedstocks for <i>'eligible waste fuels'</i> for <i>combustion</i> (conventional linear waste to energy) which are deemed as low risk to people or the environment specifically in regards to air emissions (for example NSW). All of those feedstocks mentioned above should be considered for inclusion.</p> <p><b>The following additional feedstocks are also recommended to be included as a minimum:</b></p> <ul style="list-style-type: none"> <li>● <b>Sustainable biomass crops</b> (terrestrial and aquatic), including native species (e.g. <a href="#">NSW DPI</a> field trials) and appropriate non-native species (eg hemp, bana grass etc), algae and kelp, among others. These should be prior approved by the department.</li> <li>● <b>Lawfully sourced native and non-native biomaterial</b> (eg recovered from approved clearing and maintenance works such as roadworks and other easements etc). This should include Invasive <u>Native Scrub (INS)</u> species. This should also include non-native weeds if not already captured under 'green waste' classification as recommended earlier above (e.g. Prickly Acacia).</li> <li>● <b>Forestry residues warrant specific mention</b> (a key source of biochar feedstock globally). Only around a third of a tree is typically used for lumber, with the remaining residues currently having limited applications.</li> <li>● <b>Bushfire fuel load management (including grasslands)</b> - warrants specific mention, especially given recent experiences nationally and the urgency for positive solutions.</li> <li>● <b>Heat-treated urban wood/timber residues.</b></li> <li>● <b>"Any other materials approved by the Department"</b> - This important recommendation facilitates new feedstocks as they emerge to be conditionally approved. For example, thermal treatment of <i>exotic and</i></li> </ul>	<ul style="list-style-type: none"> <li>● Production thresholds (e.g. by volume) could also be used to provide a risk-based approach to regulation of small through to large scale production.</li> <li>● Currently forestry slash pile wastes are typically open burned in many states, contributing to GHG emissions which could alternatively be directed to biochar under active management to produce low fuel zones and lower fire hazard).</li> <li>● Australian landfills are experiencing</li> </ul>

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		<p><i>native weeds</i> to provide a dual service of cost-effective weed control and concurrent climate action.</p>	<p>significant issues with timber and other organic waste residues (eg FOGO) which can be commercially turned into various grades of biochar for soil and non-soil applications. Currently other materials such as engineered timbers have limited end of life options available apart from landfill. Testing could potentially justify these being safely <b>upcycled</b> in future into valuable <i>industrial grade</i> chars.</p>
6.4 Resource Monitoring	Not started	<p>s6.4 page 7 “Where the biochar is produced using <b>digestate, food waste and/or biosolids</b>, the registered resource <b>producer must sample, measure and record</b> the composition of the produced biochar <b>for the quality characteristics prescribed in Table 1: Resource quality criteria.</b>”</p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● Inclusion of wording such as “...<b>Except where otherwise approved by the DES</b>” is recommended.</li> <li>● <b>Certain parameters in Table 1 may not always be applicable in all cases</b> as noted elsewhere in our</li> </ul>	

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		<p>comments in Section 6. Provision for justified exclusion and/or reduced requirements (e.g. scope, frequency etc) should be provided. This still provides the DES with ability to screen such issues and the industry with the flexibility to reduce regulatory burden where justified.</p>	
6.5 Resource Monitoring cont..	Not started	<p>page 7 s6.5: <b><i>“Any determination of the suitability or characterisation of the resource (including ongoing sampling) for use under this EOW code must be made by an appropriately qualified person”</i></b></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● <b>Requirements (and determinations) should reflect scale of activity and risk.</b> This condition would likely be unnecessarily inhibitive for small scale and non-commercial producers. It is recommended that provision to appropriately accommodate small scale producers/users be considered and included.</li> <li>● The need for the existing condition in s6.5 could be lessened going forward through the establishment of an appropriate biochar classification and certification system recognised by the DES for intended soil and non-soil / industrial applications. This could reduce time and expense for individual biochar producers and users to engage individual consultants. As part of the recently released Australian Biochar Industry 2030 Roadmap, ANZBIG is currently intending to develop a certification system to the grades classified in the Code of Practice, using appropriately qualified persons. Leveraging ANZBIG’s existing world-class Code of Practice could be considered and implied/referenced by the Code to provide the intended outcome for fit for purpose product.</li> </ul>	
6.7 Information to be Provided	Not started	<p>Pages 7 and 8 s6.7: <b><i>“The registered resource producer must provide the following to the resource user each time the resource is supplied for use*:</i></b></p> <p><b><i>a) a copy of the EOW code for Biochar (EOWC010002177)<sup>4</sup>;</i></b></p> <p><b><i>b) the registered resource producer’s business name, ABN and address;</i></b></p> <p><b><i>c) confirmation in writing that the resource being supplied is compliant with Requirement (6.3) of this EOW code;</i></b></p> <p><b><i>d) a most recent certificate of analysis for the quality characteristics listed in Table 1: Resource quality criteria;</i></b></p>	See also s7.2.

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		<p>and</p> <p>e) a <b>safety data sheet</b> for the resource and;</p> <p>f) for the provision of the resource by <b>retail sale only for uses under 7.2(b)</b>, the following written information <b>must be included on the product package labelling</b>:</p> <p style="padding-left: 40px;">i. instructions on the <b>safe usage and application</b> of the product; and</p> <p style="padding-left: 40px;">ii. information on <b>potential risks</b> from product usage.</p> <p>* Requirements 6.7. a) to e) <b>do not apply to the domestic uses</b> of the resource outlined in Condition 7.2(b).</p> <p><sup>4</sup> This can be a physical copy, an electronic copy or a link to the <a href="http://www.des.qld.gov.au">website (www.des.qld.gov.au)</a> where this EOW code is available.”</p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● Currently the Code requires all of the above requirements above every time biochar is supplied. This type of requirement is reflective of managing a waste for disposal rather than as a fit-for purpose commodity. This is not required for fertilisers or composts for example.</li> <li>● As currently worded, condition 6.7 requires <b>all non-domestic uses</b> of biochar to have been <b>tested for Table 1 criteria</b> (certificate of analysis required to be provided to users). Refer detailed comments on issues for Table 1 provided elsewhere in this submission.</li> <li>● The current wording does not reflect scale of activity/use and risk, except for ‘domestic’ use (which is not defined under the Code). See also related comments under 7.2 (incl 7.2b).</li> <li>● Is the limitation of ‘Domestic’ use <b>only</b> intentional? There are many other urban soil uses (and nearly all non-soil uses) that may also warrant exclusion or reduced requirements. E.g. urban sporting fields and commercial sporting grounds etc. Refer <b>Appendix 2</b>.</li> <li>● Provision of a copy of the Code to users should only be required on the first occasion, or to similar effect. It is not practical that copies of the Code be continuously given to all users for each load supplied (including biochars distributed via retailers, distribution networks, hardware chains etc etc).</li> </ul>	
6.8 Records	Not started	<p>Page 8 s6.8: “The registered resource <b>producer</b> must keep the following records for <b>each load</b> of the resource <b>supplied to a resource user</b>:</p> <p style="padding-left: 40px;">a) <b>quantity</b> (in tonnes or cubic metres) of the resource supplied;</p>	

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		<p><i>b) <b>quality criteria</b> of the resource (including but not limited to the quality characteristics listed in <b>Table 1: Resource quality criteria</b>);</i></p> <p><i>c) <b>date</b> of dispatch of the resource; and</i></p> <p><i>d) business name, ABN and address of the <b>person receiving</b> the resource.</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● As noted in earlier comments, <b>Table 1 contains some parameters not reasonably expected to be of concern in biochars from most feedstocks.</b> ‘Clean’ feeds for biochar and bioenergy with lower potential for environmental harm have been recognised in many jurisdictions globally, including Australia (for example ‘<i>Eligible Waste Fuels</i>’ recognised by the NSW EPA). <b>Appropriate provision should be included in the Code to recognise differences in risk and related testing requirements. A standard suite of tests should be used for all biochars, complemented by additional testing requirements for additional parameters considered more likely to be present in certain feeds.</b></li> <li>● Refer comments in Section 7.10 regarding the definition of each <b>load</b>, and its associated implications. Further, <b>sampling requirements for testing should be statistically relevant (frequencies etc) and proportionate to scale and risk. Blanket requirements to sampling frequencies and scope should generally be avoided. However, ‘screening suites’ of standard tests can be efficiently utilised with triggered additional testing as appropriate</b> (including frequencies). ANZBIG welcomes further discussion with DES.</li> <li>● Clarification is also required in regards to the words “<i>but not limited to</i>”. It is assumed this in regards to responsibility to ensure the scope of testing reflects potential impurities within any given feedstock. Again such a requirement should reflect the scale and potential for risk. Thresholds and stepped requirements should be considered .</li> <li>● See comments in Section 6.7 and elsewhere in this submission in relation to Table 1 and in regards to biochar products already meeting existing standards for Fertilisers, Composts and Soil Conditioners.</li> <li>● This condition reflects tracking typically required for <i>wastes</i> and is considered onerous for biochars as circular carbon commodities. ANZBIG advocates for a framework that avoids any unnecessary additional regulatory burden wherever practicable, whilst maintaining appropriate safeguards and outcomes. ‘Fit</li> </ul>	

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		<p>for purpose' outcomes-based regulation is used by existing standards such as for fertilisers, composts and soil conditioners made which should be consistent for biochar as well.</p> <ul style="list-style-type: none"> <li>• Currently there is no exclusion for small scale users (7.2b). It is recommended that trigger thresholds for volumes and/or to similar effect be considered. Many high value applications are supplied to wholesalers and retailers in small-volume packaging.</li> <li>• At commercial scale, tracking records to 'each load' level may not be practicable, including small bagged products for wholesale and retail hardware distribution etc etc) and further consideration may be required to develop appropriate workable regulation.</li> </ul>	
<b>SECTION 7 Conditions of Use</b>			
7.1 Notification Requirements	Not started	<p>Page 9, Section 7.1: <i>"Prior to operating under this EOW code, a person who <b>intends to use</b> the approved resource <b>must notify</b> the chief executive by giving a notice in the approved form <b>at least 10 days prior</b> to the commencement of using the resource <b>unless the resource is to be used on domestic lawns, gardens and landscaping only</b>".</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>• The exclusion text <i>"unless the resource is to be used on <b>domestic lawns, gardens and landscaping only</b>"</i> is too restrictive and does not reflect a range of other suitably excludable soil and non-soil/industrial uses. The exclusion should at bare minimum also include biochar fertilisers, composts and soil ameliorants compliant with the requirements of existing standards and Section 7.2. It should also justifiably exclude other uses such as non-domestic urban soil applications and most non-soil/industrial uses, (refer <b>Appendix 2</b> for examples).</li> <li>• It is also recommended that the following text be included at the end: <i>"<b>Any other materials approved upon application by regulators</b>".</i> If prescriptive listings are to be maintained, inclusion of this text is critical to facilitate new applications to emerge and be included in future progressively as they are identified and approved.</li> <li>• For uses that aren't excluded and still warrant <b>notification</b>, the DES could additionally consider using</li> </ul>	

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		<p>trigger thresholds for notification that are risk based, including but not necessarily limited to <b>quality/concentration, volume and frequency thresholds above which notification is required</b> (these factors combined are an indicatively 'load-based' trigger). Such approaches for soil ameliorants are used in parts of the USA. ANZBIG would welcome further engagement on this.</p>	
7.2 Approved Uses	Not started	<p>Page 9, Section 7.2: <i>“The approved resource is biochar which complies with Requirement (6.3) of this EOW code and is used for the following purposes:</i></p> <p><i>a) as a fertiliser and/or soil conditioner on agricultural land; or</i></p> <p><i>b) as a fertiliser and/or soil conditioner for use on domestic lawns, gardens, or landscaping.”</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● The current list of approved uses is very limited and restrictive. It negates very significant applications and markets in <b>many other soil and non-soil/industrial applications</b> (refer <b>Appendix 2</b> to this submission and to the <a href="#">Australian Biochar Industry 2030 Roadmap</a> and resources available on our website for further details). This includes many additional non-domestic urban soil uses (eg sporting fields, golf courses, street trees, green roofs etc)</li> <li>● Further to inclusion of many other uses noted immediately above, suggest also including the following (or similar): <b>“Any other uses approved by the Department”</b>. This would provide DES and the industry with flexibility to include new applications as they emerge in future without needing the Code itself to be amended, whilst ensuring they are approved by the DES.</li> <li>● <b>Sustainability</b> - Consideration of sustainability and <b>Higher Order Use</b> when producing and using biochars should be included in the Code. This should encourage sustainable use of resources (both feedstocks and biochar product) in line with both the Waste Hierarchy and the more recent UN Sustainable Development Goals (SDGs).</li> <li>● <b>Section 7.2a)</b> needs to be revised to recognise and include the following below (as 7.2a) is importantly cross-referenced elsewhere in the Code): <ul style="list-style-type: none"> <li>○ <b>“(i) biochar fertilisers produced in accordance with Schedule 2 of the Qld Biosecurity Regulations (2016)</b></li> </ul> </li> </ul>	<p>ANZBIG encourages the DES to accommodate a wider range of uses for biochar in both soil and non-soil/industrial applications, ensuring that appropriate environmental performance criteria are being met whilst still allowing technological innovation to solve current societal challenges and facilitate the path to a more circular economy. <b>Appendix 2</b> to our submission provides examples of commercial soil and non-soil/industrial applications and markets for biochars and biocarbons in Australian and NZ, as presented in the Australian Biochar Industry 2030 Roadmap.</p> <p>Contaminant thresholds</p>

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		<ul style="list-style-type: none"> <li>○ <b>(ii) biochar compost blends and soil conditioners produced in accordance with AS4454.</b></li> <li>○ <b>(iii) other biochar soil conditioners and amendments as separate to the above.”</b></li> </ul>	<p>under the Code should be at least consistent with, or justifiably higher (given lower leachability/bioavailability) , than thresholds specified under the existing Fertiliser and Compost/Soil Conditioner standards applicable in Queensland (but currently is <i>not</i>).</p>
Page 9 Resource Use as a fertiliser and/or soil conditioner*	Not started	<p><i>Page 9 (heading between Section 7.3 and 7.3): “Resource <b>use as a fertiliser and/or soil conditioner</b>*....*conditions 7.4 to 7.14 do not apply for the <u>domestic</u> uses of biochar outlined in condition 7.2(b)”</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● The exclusion of <i>domestic</i> soil use alone is too narrow. Many other non-agricultural and non-domestic urban soil uses should be considered and included (refer <b>Appendix 2</b>).</li> <li>● Refer issues raised for Section 7.2 including 7.2a and b - the proposed edits for new Section 7.2a(i) and Section 7.2a(ii) should be inserted along with the above existing text for the exclusion of ‘domestic’ uses of biochar. This includes many non-soil uses and non-agricultural and non-domestic soil uses that should also be excluded.</li> </ul>	
7.4 Resource use as a fertiliser or soil conditioner	Not started	<p><i>Page 9 s7.4: “Prior to application of the <b>resource to agricultural land</b>, an appropriately qualified person must <b>determine the agronomic loading rate</b> after considering the resource composition, crop nutritional demand and soil characteristics of the site of use.”</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● As per comments earlier in our submission, the Code should recognise well established existing</li> </ul>	

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
		<p>standards accepted by regulators and the community for Fertilisers, Composts and Soil Conditioners. ANZBIG advocates that existing ‘fit-for-purpose’ standards be recognised and applied fairly and equally for biochar applications.</p> <ul style="list-style-type: none"> <li>As currently written all applications of biochar at any level are required by this condition <i>regardless of scale</i>.</li> </ul>	
7.5 Resource use as a fertiliser and/or soil conditioner	Not started	<p>page 9 s7.5: “The resource must <b>only</b> be applied to the site of use <b>at the agronomic loading rate determined by an appropriately qualified person.</b>”</p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>In line with comments made elsewhere in this submission, ANZBIG supports regulation that is proportionate to scale of activity and risk. The requirement for expert support also should be risk-based and apply to warranted cases. Accordingly, ANZBIG seeks recognition for biochars compliant with existing standards and regulatory frameworks. <b>In other cases</b>, ANZBIG would consider supporting development of wording reflecting scale of activity and risk if appropriate (e.g. a <b>trigger threshold</b> for large scale usage).</li> <li>For example, ANZBIG contends that expert application guidance is <b>not</b> warranted for: <ul style="list-style-type: none"> <li><b>a) biochars meeting the existing standards and definitions established specifically for fertilisers and composts as noted elsewhere in this submission;</b> and</li> <li><b>b) biochars used at low loadings (volumes / frequencies)</b> - ANZBIG would welcome further engagement with DES to develop appropriate wording for such a threshold based on loading supported by scientific approach (refer <b>Appendix 3</b>).</li> </ul> </li> </ul>	
7.6 Record Keeping	Not started	<p>s7.6 page 9 “The resource <b>user</b> must maintain the following records <b>for all applications</b> of the resource <b>to agricultural land</b>:</p> <p>a) details of the assessment carried out by the appropriately qualified person to determine the agronomic loading rates in accordance with Condition (7.3);</p> <p>b) details of the site of use on which application occurs (e.g. soil pH, farm map, block/paddock details and/or GPS coordinates);</p>	

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
		<p><i>c) date of application of the resource; and d) actual application rate (expressed as the quantity (e.g. cubic metres per hectare per application)) for each application.”</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● Refer requested exclusions per comments to above related sections.</li> <li>● The above requirements may be appropriate for very large loadings of biochar, but are not considered warranted for conventional use. e.g. Farmers are not currently required (nor should be) to record where every tonne of fertiliser or compost is used, noting compost is also made from recovered organic materials and fertilisers are manufactured. As long as production quality goals are met such that the product is fit for purpose it can be confidently used in agricultural soils, and similar should be applied for biochars. ANZBIG welcomes engagement with the DES regarding establishment of appropriate thresholds for very large applications.</li> </ul>	
7.7 Storage Requirements	Not started	<p>Page 7, Section 7. 7. <i>‘Any storage of the resource on the site of use must not exceed the operational demand for the purpose of the use(s) approved under this EOW code’</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● Should the existing text be interpreted as annual/monthly/weekly operational demand? Commercial operations require appropriate stockpiles to match safe use of bulk commodities in order to be economically, technically and logistically viable.</li> <li>● <b>Clarification is required for the appropriate level of stockpiling allowed and associated safe management requirements.</b></li> <li>● An outcomes-based approach could be utilized to require <i>“any stockpiles be safely stored, maintained and recorded, notably for fire safety management in particular”</i>.</li> </ul>	
7.9 Preventing Environmental Harm	Not started	<p>s7.9 page 10: <i>“The resource must not be applied <b>within 100m of surface waters or 500m of residential dwellings</b> (excluding dwellings on the property where the resource is to be applied where the occupant’s consent has been obtained).”</i></p>	

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
		<p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>• Is there evidence of a problem with this use for a specific char that the DES is concerned about? (which could be targeted if so). Limiting all biochars to within 100m of waterways would negate highly beneficial use of adsorbent biochars for soil remediation, including interception trenches specifically to polish nutrients such as nitrates to protect riparian zones and river systems, which could significantly assist problematic runoff to the Great Barrier Reef for example. This condition is currently prescriptive across all biochars and biochar applications within the above distances.</li> <li>• Similarly, many urban uses are common (globally) which occur within 500m of residences. For example, the current wording would negate the use of Councils to use biochar in many street tree programs or sporting fields (the former being some of the most common uses globally) and inhibit climate action to Net Zero targets. This condition requires significant revision - ANZBIG would welcome further discussion to assist this.</li> </ul>	
7.10 Records	Not started	<p>Page 10 s7.10 <i>“For <b>each load*</b> of the resource received, the resource <b>user</b> must keep the following records:</i></p> <p><i>a) quantity (in tonnes or cubic metres) of the resource received;</i></p> <p><i>b) date of receipt; and</i></p> <p><i>c) business name, ABN and address of the registered resource producer who supplied the resource.”</i></p> <p><i>*Definitions page 11 defines <b>load</b> as meaning ‘the volume of resource put in or on something for conveyance or transportation, <b>carried at one time and to one site of use</b>. For example, a truck and trailer carrying the resource is considered as one load as well as multiple bins travelling by rail. Where the resource is transported via conveyor systems, information should be recorded on a daily basis until the transfer ceases’.</i></p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>• The existing wording does not distinguish small volume thresholds and could potentially even apply to minor retail bags (5kg bags for example). It is impractical for minor/infrequent users and especially for <b>retail</b> commodities, such as those products already being sold in small bagged form at national hardware outlets (commonly from overseas). <b>Minimum trigger thresholds</b> should apply to avoid unnecessary and impractical administrative requirements.</li> </ul>	

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
		<ul style="list-style-type: none"> <li>• How will the DES administer the Code for <b>imported</b> biochars? This is a critical consideration to facilitate the local biochar industry.</li> <li>• Significant record tracing requirements are a necessary hallmark of <i>hazardous wastes</i> regulation for waste <u>disposal</u>. For genuine circular economy to be appropriately enabled, excessive downstream regulation needs could be avoided (whilst maintaining a risk-based approach) by alternative <b>outcomes-based</b> regulation. This involves using appropriate product quality controls to ensure they are <b>fit-for-purpose</b> to appropriately manage risk, as done with other bulk commodities. This can still be achieved as long as the appropriate testing parameters are required, which can be periodically updated as necessary.</li> <li>• <b>If a product is demonstrated to meet appropriate criteria for safe use, it should not matter whether it is made from recycled or virgin material.</b> What matters is whether it is fit for what it is being used for. This is an important hurdle to address to facilitate <i>all</i> circular economy materials and applications, not just for biochar.</li> </ul>	
(7.12-7.13) Notification of Emergencies, Breaches and Incidents	Not started	<p>Page 10 Section 7.12 <b><i>“Any breach of a condition of this EOW code must be reported to the chief executive within 24 hours of becoming aware of the breach<sup>7</sup>.”</i></b></p> <p><sup>7</sup> Reporting can be via the chief executive’s Pollution Hotline (1300 130 372- option 2) or via online through the chief executive’s website (<a href="http://www.des.qld.gov.au">www.des.qld.gov.au</a>)</p> <p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>• The use of the words <b>“Any breach”</b> could be problematic and confusing in practice. Differentiation is suggested between administrative/minor breaches which do <i>not</i> present any material risk of harm to people or the environment, and important breaches which may do so, including <i>incidents and emergencies</i> (or technical breaches of the Code which promote such risk). Different levels/timing of notification could be considered for each. The Code could benefit from clear definitions and differentiation for these, which could also avoid unnecessary administrative load on the DES for negligible breaches that could otherwise clog up the system.</li> </ul>	

**Definitions**

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
Definitions	Not started	<p><u>Issues Raised:</u></p> <ul style="list-style-type: none"> <li>● <b>'Biosolids'</b> is not currently included and defined (refer comments on definition earlier in our submission). Clarity on the inclusion of various types of municipal biosolids (including primary and waste activated sludges) is required. <b>All forms of biosolids</b> can produce biochars for resource recovery.</li> <li>● Further clarification is required for <b>'green wastes'</b> per notes made earlier in this submission.</li> <li>● The Code could benefit from inclusion of definitions (and clear differentiation between) <b>"emergencies, incidents and breaches"</b> requiring action under Section 7 of the Code.</li> <li>● <b>Biochar</b> - As shown in <b>Appendices 3 and 5</b> to this submission (including the ANZBIG COP), ANZBIG defines <b>biochar as: "a relatively stable, carbon-rich, charcoal-like material made by heating sustainably obtained organic matter (biomass) in a controlled process with limited oxygen, using a clean technology. This product is called 'biochar' when it is used as a soil amendment, or for other uses that store the carbon in a durable form. Biochar has an organic carbon content greater than 30% and a molar H/C<sub>org</sub> ratio below 0.7"</b>. It is recommended the ANZBIG definition of biochar be adopted or the existing definition modified accordingly.</li> <li>● Other <b>charcoals</b> and <b>biocarbons</b> do not meet this definition but can and should be <b>separately defined and scoped under this code</b> (see related comments column), as they also play an important role in circular economy and climate action and may be produced by the same facilities that make <b>biochars</b>. <b>It is important to clearly differentiate these carbon commodities</b>, particularly to <b>facilitate transparent climate reporting</b> that is critically important to track progress toward Net Zero. <ul style="list-style-type: none"> <li>○ Should the ANZBIG definition <i>not</i> be adopted, the existing definition requires specific inclusion of the following text at the end of the current wording <b>"...when used as a soil amendment, or for other uses that store carbon in a durable form, as demonstrated by a carbon content &gt;30% and a molar ratio of H/C<sub>org</sub> below 0.7"</b>. This is consistent with definitions of biochars commonly used globally where the term is used <i>only</i> for applications which provide CO<sub>2</sub> Removal (CDR). Other oxidative/combustion uses which do <i>not</i> store carbon in durable form are typically referred to as <b>biocarbons</b> and conventional <b>charcoals</b> (refer third figure in <b>Appendix 2</b>).</li> </ul> </li> <li>● <b>Biomass</b> - ANZBIG encourages the Code to include wording that encourages <b>sustainable</b> sources of biomass feedstocks to make biochar, including (but not limited to) wasted resources otherwise destined</li> </ul>	<p><b>Biocarbons</b> and charcoals for oxidative uses such as metallurgy (see <b>Appendix 2</b>) will also play a significant role in climate action through displacement of fossil carbon (avoided new emissions) to decarbonise major industries, however they do not remove existing CO<sub>2</sub> already in the atmosphere (CDR), which the IPCC has identified as now urgently required for climate action to meet Net</p>

Section/page reference	Status <i>(DES Review)</i>	Issues / Recommendations Raised	Other Supporting Comments
		<p>for landfill or burning. <b>It is important the Code does not inadvertently encourage <i>unstainable</i> clearing of biomass to facilitate production of biochar.</b> ANZBIG intends to develop further guidance on sustainable feedstocks consistent with world best practice for biochar production as part of the industry Roadmap, and welcomes further engagement with DES on this.</p> <ul style="list-style-type: none"> <li>● <b>'Domestic Use'</b> is not currently included within the definitions list but used within the Code to provide exclusions. As per related comments elsewhere in this submission, there are numerous <i>non-domestic</i> urban soil applications that should also be considered for the exclusions currently provided (refer <b>Appendix 2</b>).</li> <li>● <b>'Load'</b> - Refer comments in <b>Section 7.10</b> regarding the definition of load. This also impacts other related sections where 'load' is used (eg testing).</li> </ul>	<p>Zero by 2050. <b>Both</b> biochar and other biocarbons/charcoals are jointly need to be included and facilitated under the draft EOW Code to meet climate goals.</p>

A list of Appendices supporting our submission is provided further below.

Thank you again for the extended opportunity to provide comments on the draft Code. Should you have any further queries on our comments please do not hesitate to contact us. ANZBIG welcomes further engagement with the department in progressing this important document.

Kind regards,

**Don Coyne**

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Executive Board, Technical Advisory Board ANZBIG  
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**LIST OF APPENDICES** to this submission:

**Appendix 1: ANZBIG Biochar Fact Sheet**

**Appendix 2: Soil and Non-Soil Uses and Markets for Biochars and Biocarbons** (for more info refer Australian Biochar Industry 2030 Roadmap [here](#))

**Appendix 3: Example Scientific Papers** (further can be provided upon request):

**3a)** Joseph and Cowie et al 2021, *“When Biochars Work and When they Don’t - A review of mechanisms controlling soil and plant responses to biochar”*

**3b)** Lucchini and Quillam et al 2013, *“Does biochar application alter heavy metal dynamics in agricultural soil?”*

**Appendix 4: ANZ Biochar Industry Code of Practice** (ANZBIG 2021), which classifies three primary gradings of biochars - ***Feed Grade (FG), Standard Grade (SG) and Industrial Grades (IG)***.

**Appendix 5: Copy of presentation to EPA Victoria (Sep 2023)**