Government of **Western Australia**
Department of **Environment Regulation**

GUIDELINE

Guideline: Submitting an application for the use of waste-derived materials (case-by-case determination)

Draft released for consultation

Version: Draft

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Accessibility This document is available in alternative formats and languages upon request.

About this consultation

Topic of this consultation	A draft Department of Environment Regulation (DER) Guideline: Submitting an application for the use of waste-derived materials (case-by-case determination)
Scope of this consultation	The waste management industry and all those who produce, handle and use waste and waste-derived materials
Geographical scope	Western Australia
Consultation duration	30 April 2015 – 27 May 2015 (4 weeks)
After the consultation	The responses to this consultation will assist in finalising the proposed Guideline: Submitting an application for the use of a waste-derived material. When this consultation has ended all responses will be reviewed and made available on DER's website. A document summarising the responses and how they have been considered will also be made available on DER's website at www.der.wa.gov.au.

About public consultation

The Department of Environment Regulation carries out public consultation to canvas the views of all stakeholders and interested parties to inform a transparent and accountable decision-making process. By making a submission, you are consenting to the submission being treated as a public document and being published on the Department's website. Your name will be included but your contact address will be withheld for privacy.

If you do not consent to your submission being treated as a public document, you should mark it as confidential, specifically identify those parts which you consider should be kept confidential, and include an explanation. The Department may request that a non-confidential summary of the material is also given. It is important to note that even if your submission is treated as confidential by the Department, it may still be disclosed in accordance with the requirements of the *Freedom of Information Act 1992*, or any other applicable written law.

The Department reserves the right before publishing a submission to delete any content that could be regarded as racially vilifying, derogatory or defamatory to an individual or an organisation.

Please take careful note of the deadline for comment, **27 May 2015**, as no late submissions will be accepted.

Please direct comments or any questions about this report to:

By email: end_of_waste@der.wa.gov.au (end_of_waste@der.wa.gov.au)

By post: End-of-waste review
Department of Environment Regulation
Locked Bag 33
CLOISTERS SQUARE WA 6850

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Definitions

contaminated, in relation to land, water or a site, has the same meaning as it has in section 4(1) of the *Contaminated Sites Act 2003* and ***contamination***, in relation to land, water or a site, has a corresponding meaning.

landfill means premises specified in category 63, 64, 65, 66 and/or 89 of Schedule 1 to the *Environmental Protection Regulations 1987* in respect of which a licence is held or in respect of which the occupier is required to hold a licence under the EP Act.

end user means a person who uses a waste-derived material (WDM).

environmental harm has the same meaning as it has in section 3A of the *Environmental Protection Act 1986*.

producer means a person who produces a WDM.

qualified person means a person possessing relevant tertiary qualifications to a minimum bachelor level such as in environmental science or environmental engineering and a minimum of three years' experience in analysing laboratory results related to soil science or contaminated sites.

waste has the same meaning as it has in section 3(1) of the *Environmental Protection Act 1986* and section 3(1) of the *Waste Avoidance and Resource Recovery Act 2007*.

waste-derived material (WDM) has the same meaning as it has in the *Guidance statement: Regulating the use of waste-derived materials.*

1. Background

The Department of Environment Regulation (DER) encourages the use of waste-derived materials (WDMs) in circumstances where their use does not cause an unacceptable risk to the environment, to divert waste from landfill and reduce the demand for raw materials and fossil fuels.

The ***Guidance statement: Regulating the use of waste-derived materials*** sets out DER's intention to develop general material guidelines for the production and use of WDMs, and also sets out the end-of-waste criteria that will be applied through the material guidelines to determine when waste has ceased to be waste.

The guidance statement also commits to the development of a guideline for submitting an application for the use of WDMs on a case-by-case basis, for determination and assessment by DER. This document fulfils that commitment.

2. Introduction

The case-by-case determination by DER of whether a WDM will no longer be considered waste is based on the following end-of-waste criteria:

- that the production and/or characteristics of the WDM meet all defined and relevant specifications or standards as evidenced through appropriate quality assurance/sampling and testing systems; and
- that the WDM will be used to replace a raw material and that use will not result in unacceptable impact on the environment.

Priority will be given to the determination of applications based on:

- the volume of waste that will be diverted from landfill;
- the uses for the WDM not resulting in unacceptable impacts on the environment; and
- the need for further regulation of the WDM and its end use.

Sites that produce WDMs may require a licence under Part V Division 3 of the *Environmental Protection Act 1986*. The requirements contained in this application guideline must be met in addition to any licensing requirements.

It is an end user's responsibility to ensure that the WDMs they use are technically suitable and otherwise fit for their purpose and that they do not cause environmental harm, pollution, unreasonable emissions or unauthorised discharges contrary to the EP Act or other legislation related to WDMs.

2.1 Purpose

This guideline sets out the process for submitting an application to DER for a determination. A WDM that is to be produced and used in accordance with the approved application will be recognised by DER has having ceased to be waste.

2.2 Structure

This guideline is structured as follows:

Sections 1 and 2 set out the context and purpose of this application process, and describe how this guideline fits into the current regulatory framework.

Section 3 describes the application process.

Section 4 describes the key considerations for the production and use of WDMs and the minimum required information for an application to be assessed.

Section 5 provides further information and contacts that may be relevant to users of this guideline.

2.3 Review

This guideline will be reviewed by 30 June 2016 to consider its content, application and effectiveness. If there are changes to legislation or policy on which this guideline is based, this guideline will be reviewed and updated as required within three months of the change.

3. Application process

This section provides general guidance on the process for submitting an application for a determination that a WDM has ceased to be waste. The considerations are based on DER's legislation and the *Guidance Statement: Regulating the use of waste-derived materials*. Additional guidance on applying for the use of WDMs that fall under specific categories may be provided as addendum to this general application guideline.

It is the responsibility of applicants to ensure that their application adequately demonstrates that the WDM meets the end-of-waste criteria. There may be variation in the end-of-waste criteria depending on the source of the waste and its end use.

Figure 1 shows the application process.

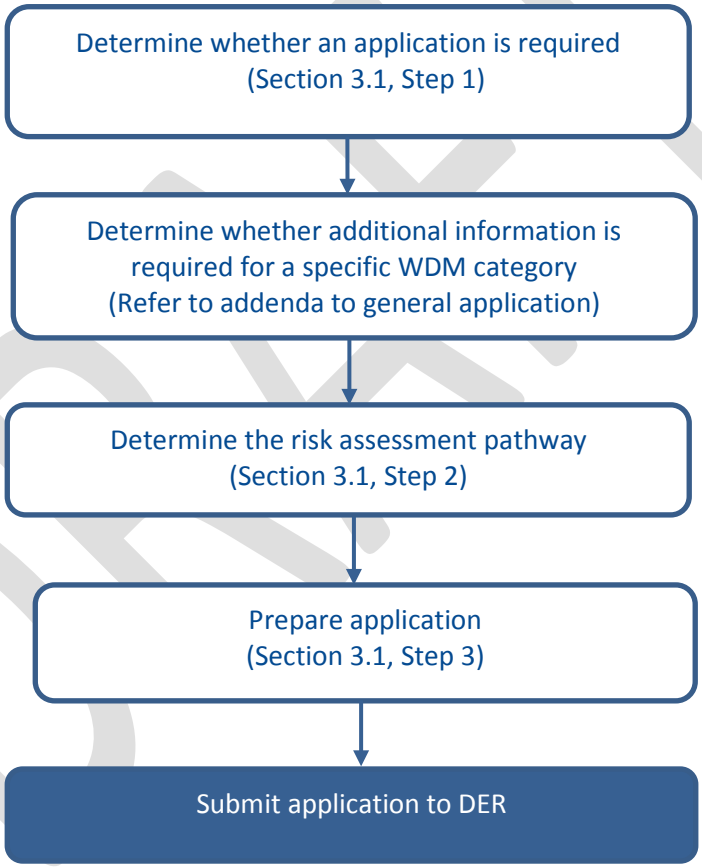

Figure 1 The application process

3.1 Key steps of the application process

Step 1

Applicants should determine, through the checklist below, whether an application must be submitted.

Checklist	Detail
1. Will the WDM be used to replace a raw material?	All WDMs considered under the end-of-waste framework must be used to replace a raw material. (for example: sand, clay, hard rock, limestone, gravel, and other natural materials).
2. Is the WDM outside the scope of an existing DER material guideline or previous DER approval?	DER material guidelines are available at: http://www.der.wa.gov.au/your-environment/waste/waste-derived-materials.

If the answer to both questions above is yes, the applicant should proceed with an application for case-by-case determination.

Step 2

For WDMs that fall within a specific category with additional requirements also refer to the relevant addendum. DER is developing a specific category for manufactured fill, which will undergo separate consultation.

Step 3

The applicant should consider which risk assessment pathway is appropriate to their WDM prior to beginning the application process. Details on risk assessment for general applications are in Section 4.2.

Step 4

Before submitting an application to DER, applicants must ensure their application is complete and includes:

(i) an application form (Appendix A);

(ii) a report that addresses all relevant requirements as outlined in Section 4

and,

(iii) if a detailed risk assessment has been undertaken, the report of an accredited independent reviewer (see Section 4.2, Box 2).

Applications may be submitted to DER by email (end_of_waste@der.wa.gov.au) or posted to:

Department of Environment Regulation
Locked Bag 33
CLOISTERS SQUARE WA 6850

Step 4

DER will assess applications. DER may request additional information if further supporting data are needed.

4. Key considerations for the production and use of WDMs

There is the potential for a range of chemical, physical and biological contaminants to be present in WDMs. These could cause harm to public health and the environment if they are not treated, and contaminants contained and controlled by disposal to an authorised landfill.

Consideration by DER of where a WDM can be safely used will be based on identification of the type, concentration and nature of contaminants in the waste. As part of this assessment, it is necessary to identify any potentially harmful interactions between the contaminants in the waste-derived material, its proposed use/s and the environment.

Particular consideration needs to be given as to whether the application will lead to the build-up of potentially harmful persistent chemicals, the accumulation of excess nutrients, leaching of potentially harmful chemicals into groundwater or the disruption of soil biota and ecological functions.

The use of a WDM should not compromise the environmental quality of a site nor constrain the reasonable and usual use of sites (both current and future).

The applicant must be able to demonstrate that the use of the WDM will not cause harm to public health or the environment prior to its transport and/or reuse.

National Environment Protection (Assessment of Site Contamination) Measure
The National Environment Protection (Assessment of Site Contamination) Measure (NEPM) provides a number of investigation and screening levels, applicable to soils, groundwater and soil vapour. When these levels are exceeded at a site, assessment of the site's contamination is required to determine the suitability of that site for a particular use. The NEPM also provides methodologies for developing additional investigation levels to protect human health and the environment. The investigation and screening levels in the NEPM were not developed as criteria for determining the suitability of a WDM to replace a raw material. Increasing concentrations of chemical substances at a site up to the investigation and screening levels set out in the NEPM by the application or use of a WDM is therefore not permitted by DER.

4.1. Characteristics of the WDM

This section sets out the general information requirements about a WDM and the waste inputs that are used to produce it. If the applicant considers that a requirement in this section is not relevant to a WDM, appropriate reason(s) and supporting evidence must be provided.

A sampling analysis and quality plan (SAQP), together with related laboratory testing results and data evaluation, must be provided for all relevant parts of an application for a WDM, as set out in the following section. The requirements for SAQP are set out in Appendix B.

4.1.1. General information on waste inputs

Information must be provided about each waste input that is used to produce the WDM including:

- the waste stream (e.g. municipal solid waste, commercial and industrial waste, construction and demolition waste) and place of origin of each waste, who generates it and how it is generated;
- the total amount of each waste input generated (state wide if possible), current uses and/or disposal processes for the waste; and
- the containment infrastructure that will be used to store the waste from its receival on site to when it leaves the site as a WDM.

4.1.2. Characteristics of each waste input

Details of the physical and chemical properties of each waste input to be used in the production of the WDM ar required. Applicants should undertake the following:

- Provide photos that are clear and representative of each waste material (including close-ups).
- Describe the physical properties of the waste. This can include: colour, odour, density, hardness, melting point, boiling point, electrical conductivity, thermal conductivity, ductility, malleability and pH.
- Describe the chemical composition of the waste material. In addition, describe the potential physical, biological (e.g. pests weeds and diseases, including pathogens such as phytophthora and seeds from declared plants), and chemical contaminants for each waste input.
- Consider whether the waste has come from a site where a previous use or a contaminated site classification indicates that contaminants (including radioactive materials) may be present in the waste. If so:
  - describe the potential contamination with reference to DER's *Guideline for assessment and management of contaminated sites* (2014), which identifies common contaminant types that may be present as a result of a previous land use or potentially contaminating activity. Depending on the nature and proposed use of the WDM, a literature search may be necessary to identify potential contaminants of concern; and
  - include testing results for the potential contaminant(s) identified in the characterisation of the waste.
- Describe the variability of each waste input, including the variability in its physical properties, chemical composition, risk of contamination and other relevant characteristics (consider batch, source and temporal contributions to heterogeneity).

This section must be supported by a SAQP that meets the requirements set out in Appendix B.

4.1.3. Waste treatment

Where waste treatment is required prior to the production of the WDM, for each waste input material requiring treatment, the applicant must:

- describe the purpose of the waste treatment;
- provide details of specific treatment process(es), including any treatment required to stabilise the waste (e.g. treatment to increase the buffering capacity to reduce the mobility of metals) or otherwise to ensure that the waste meets the product specification (Section 4.2.3); and
- describe the characteristics of the waste after it has been treated as set out in Section 4.1.2 and provide details of any critical control points in the waste treatment process(es) that are required to ensure characteristics of the treated waste are consistent.

Waste treatment procedures must either reference an existing standard, guideline or code of practice, or provide details of the standard operating procedure developed to treat a particular waste material. If an existing standard, guideline or code of practice is being adopted, applicants must provide a link to where it can be found, or include it as an attachment to the application.

This section must be supported by a SAQP that meets the requirements set out in Appendix B.

If there is no waste treatment required prior to the production of the WDM, the applicant should state “No waste treatment occurs prior to the production of the WDM”, and provide justification and/or evidence to support this position.

4.1.4. General information on the WDM

The applicant should answer/undertake the following:

- What is the common or the trade name for the WDM?
- What raw material will the WDM replace?
- Provide a general description of the WDM, and how it differs from the waste it is derived from.
- Describe the process used to generate the WDM from waste.
- How much of the WDM will be produced each year?
- Provide details of the need for the WDMs to meet any existing recognised product standards or specifications.
- Is a material safety data sheet required for the WDM? If so, include it as an attachment.
- If the WDM has been subject to a previous DER approval or application, include the DER reference number.
- If the WDM has been subject to approval by another government agency, include the other agency reference number and relevant documents as an attachment.
- Provide a summary of the literature and research that is directly relevant to the WDM, and describe how it has been considered in this application, including its relevance to Western Australian conditions and specific geographical location/s proposed for the use of the WDM. A reference list for this review should be included as an attachment to this application.

4.1.5. Blending of waste and/or other materials to produce the WDM

If production of the WDM involves blending of waste materials or blending of waste with non-waste materials, each waste input must be individually characterised (Section 4.1.2).

The applicant should identify the proportional breakdown of each component that is blended to produce the WDM, and the variability of the blending ratios.

DER will only consider blending in the production of waste derived materials where justification is provided as to how the waste component (s) of the proposed WDM is fit for the proposed use.

If no blending of waste or other inputs occurs in the production of the WDM, the applicant should state “No blending of waste or other inputs occurs in the production of the WDM.”

4.1.6. Characteristics of the WDM

The applicant must provide details of the physical and chemical properties of the WDM, addressing the following questions:

- What is the likely variability in composition of the WDM? Include details of the variability in its physical properties, chemical composition, risk of contamination and other relevant characteristics (consider batch, source and temporal contributions to heterogeneity).
- What are the relevant (technical) characteristics of the WDM? This may already be specified in an Australian Standard (or equivalent) or Code of Practice. For example, if the WDM is intended to be used as aggregate, the relevant Australian Standard specifies certain geotechnical characteristics such as density, particle size distribution, strength and plasticity properties.

This section must be supported by a SAQP that meets the requirements set out in Appendix B.

4.1.7. Proposed product specification

Applicants are required to propose a product specification for their WDM. The product specification lists the chemical and other attributes of the WDM that have the potential to cause environmental harm depending on how and where the product will be used; for example, concentration of metals and other inorganic species, organic compounds as well as physical characteristics such as pH. The acceptable limits (and units) for each parameter should be specified. If there is an existing Australian Standard (or equivalent) for the intended use, this should inform the development of the product specification.

It is recommended that the product specification is developed iteratively by the applicant during the risk assessment process (Section 4.2) and must either:

A. be equivalent to (or more stringent than) the characteristics and leachate of the raw material comparator.

or

B. reference the characteristics of the WDM, existing relevant standards,

agreements or regulations in Western Australia and/or other jurisdictions, and the outcomes of a detailed risk assessment.

Note that each waste input must meet the product specification prior to being introduced into the production process for the WDM.

4.1.8. Proposed use

Provide specific details of the proposed use or range of uses for the WDM, answering the following as relevant:

- Is the WDM a specific or a general purpose product?
- How is the WDM used (one-off application or multiple applications, application frequency and method)?
- List all proposed uses.

The proposed use of the WDM should be developed iteratively within the risk assessment process (Section 4.2).

Applicants should also detail any limitations on each proposed use to ensure that use of the WDM does not pose a risk to public health or the environment. Use limitations will depend on the properties of the WDM and the risk assessment outcomes. Considerations include, but are not limited to:

- land use – existing and planned/proposed;
- proximity to human and environmental receptors;
- aquifer vulnerability to contamination (nature of aquifer and nature and thickness of any cover, presence of preferential migration pathways);
- landform/site drainage and slope (gradient);
- erosion and flood potential; and/or
- other potential restrictions for the receiving environment (such as frequency and volume of application, for example. in the case of soil amendments)

If a WDM is proposed to be used for a development that requires approval under the *Planning and Development Act 2005,* such approval must have been granted prior to submission of this application.

4.2. Risk assessment

Applicants must undertake a risk assessment to demonstrate that the use of the WDM does not pose an unacceptable risk to public health and the environment.

There are two pathways for assessing the risk arising from the use of a WDM (see Figure 2):

1. a screening risk assessment using a natural raw material as a product "comparator" (for example Tamala or 'natural' limestone but not 'reconstituted limestone' as this product contains cement) (Section 4.2.1) or other simplified risk assessment approach described in the addendum for a specific type of WDM, such as manufactured fill; or
2. a detailed risk assessment using a source – pathway – receptor approach, and accredited independent review of the application (Section 4.2.2);

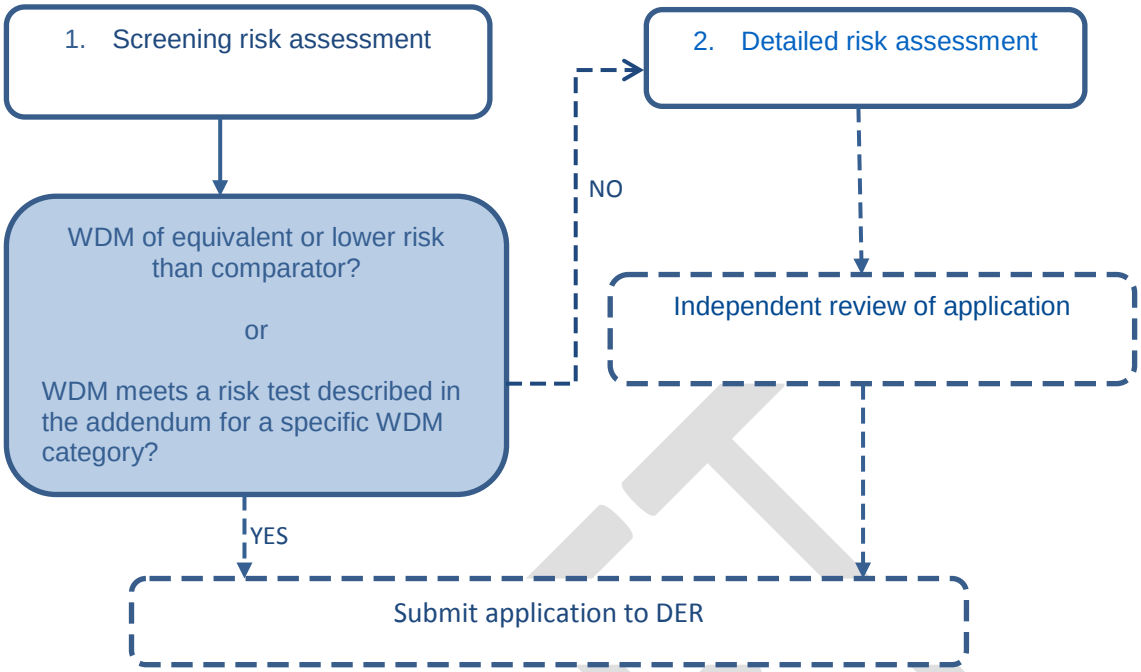

Figure 2 Risk assessment pathways

Applicants should consider the appropriate risk assessment pathway for their WDM.

To illustrate the process, the risk assessment approaches set out in this guideline assume that the WDM will be applied to land and that the dominant pathway for contaminants will be in the dissolved form ('leachate') that percolates through the soil profile into groundwater. Other pathways (e.g. direct contact with soil) may also require assessment depending on the nature of the WDM and the proposed use.

In the majority of cases, unless the use of the WDM is considered by DER to be low risk, the need to conduct leaching tests will need to be considered as part of risk assessment.

Leaching tests

Leaching tests are tools to quantify potential environmental risks associated with the leaching of chemical constituents from WDMs that are applied to or in contact with soils. Information from leaching tests can be used in a number of ways including:

- screening-level assessments at a site-specific or regional scale;
- detailed site-specific assessments of leaching potential; and
- performance comparisons between different materials or treatment processes under specific re-use scenarios.

Where a WDM is intended for widespread use, DER will generally require that variable-pH leaching tests, and variable liquid-to-solid ratio tests on the material will be undertaken using the *US EPA Leaching Environmental Assessment Framework* (LEAF) test method 1313. DER may accept a more limited leaching test regime where the use of the material will be restricted to a specific site or type of site (specified in the application).

If an applicant submits a screening risk assessment using a natural raw material as a product comparator, DER may request further information with respect to its use in sensitive environments outside its natural occurrence.

4.2.1. Screening risk assessment

A screening risk assessment using a natural raw material as a product "comparator", or other approach described in the addendum for a specific WDM category may be undertaken under certain circumstances, in lieu of a detailed risk assessment.

Risk assessment using a natural raw material as a product comparator
In situations where a WDM is replacing a raw material in an equivalent use, risk assessment may be undertaken using a natural raw material as a comparator. In this case, the risk assessment should be supported by a SAQP that meets the requirements set out in Appendix B, and consists of the following steps:

- Characterise the raw material comparator for the parameters identified to be relevant to the WDM as set out in Section 4.1.6 and identify contaminants of concern.
- Undertake leaching tests on the relevant suite of chemical parameters and contaminants of concern required to ensure that the WDM will not affect the beneficial use of groundwater beneath the site. In rural areas, the appropriate assessment levels may be for potable water use (Australian Drinking Water Guidelines) stock drinking water or irrigation water quality. Further information is available in DER's 2014 guideline *Assessment and management of contaminated sites* and the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).*
- Compare the characteristics and leachate of the raw material comparator with those of the WDM (i.e. the results of Section 4.1.6 for the WDM):
  - If this comparison demonstrates that the WDM leachate from the WDM meets the appropriate assessment levels as determined above, and that the leachate quality and other characteristics are comparable with or pose a

lower risk to public health and the environment than the leachate from the raw material comparator, this evidence may be submitted as a screening risk assessment. There is no need for a detailed risk assessment and independent review of the application.

- If this comparison demonstrates the WDM leachate does not meet the appropriate assessment levels as determined above, or the leachate quality or other characteristics are not comparable to or pose a higher risk to public health and the environment than the raw material comparator, a detailed risk assessment and independent review of the application must be undertaken.

4.2.2. Detailed risk assessment

The source – pathway – receptor approach provides for a detailed risk assessment of the WDM and its proposed use. Appendix C provides an example process for assessing potential impacts to groundwater.

Applications that required a detailed risk assessment using the source – pathway – receptor approach must be reviewed by an independent accredited reviewer prior to being submitted to DER.

Requirements of an independent reviewer and report

The independent reviewer must be a contaminated sites auditor accredited by DER under the Western Australian *Contaminated Sites Act 2003,* or a contaminated sites auditor accredited under equivalent legislation in another Australian jurisdiction or under another scheme approved by DER.

The independent reviewer's report must be prepared with regard to the requirements set out in this application guideline and include:

- a review of the application including any research, data, standards, specifications and regulations that it is based on. This review should consider the robustness of the application, whether current good practice has been used, and provide recommendations.
- a review of the risk assessment including the identification of any additional potential risks relating to the WDM and its proposed use(s) not included in the application, and recommendations to mitigate these risks.
- the reviewer's expert opinion on whether or not the WDM and its proposed use(s), as described in the application, pose an unacceptable risk to public health or the environment.

4.2.3. End user instructions or agreements

Where relevant, include any instructions, limitations on the proposed use or agreements required with end users of the WDM (for example, use not permitted below the seasonal high water table). The following information should be provided:

- details of any limitations or instructions that end users need to be aware of and how end users will be informed (for example, instructions providing the restrictions on volume, timing or frequency of applications); and
- copies of any end user instructions/agreements that current or proposed to support the use of the WDM.

4.3. Quality assurance and control procedures

Applicants are required to develop quality assurance and control procedures for the production of the WDM, and to ensure that the final WDM meets the proposed product specification and does not pose an unacceptable risk to public health and the environment. Quality assurance and control procedures must be specific to the WDM. The procedures must clearly identify the point at which the applicant considers that the WDM ceases to be waste and waste management controls are no longer required.

Applicants should provide details and a justification of the proposed quality assurance and control procedures required at waste generation or waste treatment, and WDM production facilities to ensure the requirements of the proposed product specification have been met, such as:

- waste acceptance and inspection procedures;
- quality assurance measures such as sampling and testing of waste inputs and final WDM to ensure it meets the product specification. Proposed sampling and testing should be appropriate to a batch or continuous process as relevant for the WDM and be and supported by a SAQP as set out in Appendix B;
- standard operating procedures (work instructions) should be developed for the WDM production process to ensure integrity of the end product, and required staff training and experience to ensure compliance with the proposed specification;
- procedures to be followed if it is identified that the sampled WDM (or batch of WDM) does not comply with the product specification (e.g. rejection of incoming waste, reprocessing of batch for retesting, review of procedures to ensure integrity of end product);
- periodic independent auditing of the production facility; and
- a description of how existing protocols or standards have been used to inform the development of the quality assurance and control procedures and why they are appropriate (provide a link for any for standards or protocols that have been referenced, or, if unavailable, include as an attachment to this application).

Producers are responsible for ensuring their operational procedures meet all other statutory requirements, including but not limited to:

- responsibilities under occupational health and safety legislation;
- requirement set through the conditions of their Part V licence; and
- requirements set out in the *Guidelines for managing asbestos at construction and demolition waste recycling facilities,* DEC (2012) (Asbestos Guidelines).

4.4. Recordkeeping and audit procedures

Propose a recordkeeping and auditing plan for the production of the WDM that considers the following elements:

- records for all waste inputs, including the type and quantity of waste and all information obtained about the waste prior to its acceptance at the facility; and
- records for the inspection, sampling and testing of the waste and WDM during its production.

Regular audits of the WDM production facility by a qualified person who is not involved with the day-to-day operations of the facility will be required to determine compliance with any DER approval. A qualified person may be a member of staff from a similar site, a consultant or a representative of an appropriate industry body who otherwise meets the criteria set out in the definition of “qualified person”.

Producers of WDMs will generally be expected to maintain all records in electronic or hard-copy form, for a minimum period of 5 years, so that they can either be inspected by, or produced to, DER inspectors upon request. There should be a clear and logical system for keeping records at all premises.

4.5. Review by other agencies

Where relevant, applicants must seek advice or prior written approval from all other relevant government agencies, which may include (but are not limited to) the Radiological Council, the Department of Health, the Department of Water.

- What agency advice or approval has been sought, and what is the relevancy to this application?
- Attach copies of all advice or approvals to this application and include written confirmation from the agency that the advice/approval is current/applicable.

5. Further information and contacts

Department of Commerce—Worksafe

For more information about asbestos in the workplace and working with hazardous chemicals, visit the Worksafe website at:

www.commerce.wa.gov.au/WorkSafe or phone: 1300 307 877

Department of Environment Regulation

For more information about licensing and works approvals visit the Department of Environment Regulation website at the following link or phone: 6467 5000

www.der.wa.gov.au/our-work/licences-and-works-approvals

For more information about contaminated sites visit the Department of Environment Regulation website at the following link or phone: 1300 762 982

www.der.wa.gov.au/your-environment/contaminated-sites

Department of Environment Regulation, *Assessment and management of contaminated sites* (2014) www.der.wa.gov.au/your-environment/contaminated-sites/61-contaminated-sites-guidelines

Department of Environment and Conservation, (2012), *Guidelines for managing asbestos at construction and demolition waste recycling facilities.*

Guidelines for managing asbestos at construction and demolition waste recycling facilities

Department of Health

For more information on asbestos material and contaminated sites, visit the Department of Health website at the following links or Telephone: 9388 4999

www.public.health.wa.gov.au/3/1144/2/contaminated_sites.pm

www.public.health.wa.gov.au/3/1143/2/asbestos_in_the_home.pm

Guidelines for the assessment, remediation and management of asbestos-contaminated sites in Western Australia (2009).

www.public.health.wa.gov.au/cproot/3763/2/Guidelines%20for%20Asbestos-Contaminated%20Sites%20-%20May%202009.pdf

Landgate

For more information about the location of acid sulfate soil risk areas, visit the Landgate website at:

https://www2.landgate.wa.gov.au/bmvf/app/waatlas/

Appendix A – Application form

GOVERNMENT OF WESTERN AUSTRALIA

Department of Environment Regulation

Application – use of a waste-derived material

Part 1 Applicant details

Applicant is a(n)

☐ individual ☐ corporation ☐ partnership ☐ other type of organisation (indicate)_____

Name		ABN	
Address			
Telephone number		Email	
Website (If any)			

Does the applicant hold a DER licence that is relevant to this application?

☐ No ☐ Yes If yes, licence number

If applying as a corporation, partnership or other type of organisation, provide details of a contact person below

Name			
Address			
Telephone number		Email	

Part 2 About the proposed WDM

What is the common name of the WDM?			
Which raw material does the WDM replace?			
Is the WDM patented?	☐ No ☐ Yes	Date approved: *dd / mm / yyyy*	Patent number:
Will the product be marketed under a registered trade name?	☐ No ☐ Yes	Date of registration: *dd / mm / yyyy*	Registration number:

Part 4. Confidentiality

Information contained in this application will be treated as public information unless it is clearly marked as confidential. It is important to note that even if your application is treated as confidential by the Department, it may still be disclosed under the Freedom of Information Act 1992 or any other applicable written law.

Does this application contain confidential information? ☐ Yes ☐ No

If this application contains confidential information, attach a statement that identifies any specific parts of the application that are confidential and include an explanation.

Is a statement of confidential information attached to this application? ☐ Yes ☐ No

Part 5 Accredited Independent reviewer

Has this application been reviewed by an accredited independent reviewer?	☐ Yes ☐ No	*All applications that require a detailed risk assessment (see Section 4.2.2 and Appendix C) must be reviewed by an accredited independent reviewer prior to being submitted to DER*

Part 6 Statement of the accredited independent reviewer

Name			
Company (if applicable)			
Address			
Telephone number		Email	
Relevant accreditation			

I certify that I am an accredited independent third party to this application. The report I have provided

- has been prepared with regard to the requirements of an independent report set out in the Guideline – Submitting an application for the use of a waste-derived-material (case-by-case determination); and
- represents my expert opinion and recommendations with regard to this application.

I understand that under the *Environmental Protection Act 1986* section 112, "a person who gives or causes to be given information that to their knowledge is false or misleading commits an offence."

Name	
Signature	
Date	

Part 7 Signature of applicant and lodgment

I certify that the information contained in this application (including attachments) is accurate.

I understand further information may be required from me if necessary.

I understand that under the *Environmental Protection Act 1986* section 112, "a person who gives or causes to be given information that to their knowledge is false or misleading commits an offence."

Name of Applicant	
Signature	
Date	

Send by email or post original application to:
Department of Environment Regulation
Locked Bag 33, CLOISTERS SQUARE
PERTH WA 6850
Email: end_of_waste@der.wa.gov.au
Telephone: 6467 5000
For more information: http://www.der.wa.gov.au/your-environment/waste

Please retain a copy of this form for your records

Appendix B - Sampling analysis and quality plan

The requirements of a sampling analysis and quality plan (SAQP) are outlined in this appendix, and include related laboratory testing results and data evaluation. The recommended general content for a SAQP is discussed below, however, this content may be varied according to the nature of the waste input streams and the WDM being produced.

Chemical analyses should be performed using established standard methods from recognised sources such as Standards Australia, the United States Environmental Protection Agency (US EPA), the American Public Health Association (APHA), the American Society for Testing and Materials (ASTM) and the International Standards Association.

Laboratories should be accredited for relevant analytical procedures by the National Association of Testing Authorities (NATA), or by an organisation recognised under NATA's Mutual Recognition Agreement Network, or according to an appropriate standard dealing with laboratory quality assurance. Laboratory limits of detection must be below the product specification limit for that parameter.

Indicative contents of a SAQP

1. Objectives of the sampling program
2. Analyte selection and analysis methods
   - Justification for the selection of analytes[1] and analysis methods, with reference to relevant research and literature.
3. Sampling design and justification
   - sample locations, depths and frequency
   - field screening methods and purpose
   - rationale selection of samples for laboratory analysis
4. Sampling methods and procedures
   - sampling procedures
   - sample containers
   - preservation of samples
   - storage and transport
5. Field procedures including quality assurance and quality control procedures
   - standardised forms for recording relevant field data (completed copies to be included in the report)
   - sampling logs (primary samples, trip and field blanks, rinsate samples, replicate samples, decontamination events etc.)
   - sample log (sample description, composition, grain size, odours, staining etc.)
   - field testing equipment, instrument calibration records, instrument detection limits (e.g. field X-Ray Fluorescence analysis)

[1] DER's Contaminated sites guideline *Assessment and Management of Contaminated Sites* provides an indication of potentially relevant analytes based on previous land use(s).

- chain of custody form identifying (for each sample) the sampler, media, collection date and time, sample preservation method, analyses to be performed, sender signature and departure date and time.

Laboratory testing

1. Chain of custody form with laboratory signature, receipt date and time and comment on condition of samples (e.g. chilled, warm, damaged/missing samples etc.)
2. Laboratory analytical certificates
3. Laboratory QA/QC report:
   - analytical methods and laboratory accreditation for methods used
   - holding and extraction times for each analysis/sample
   - sample splitting techniques
   - surrogates, spikes and recoveries
   - instrument/method detection limits and matrix/practical quantification limits
   - standard and reference solution results
   - certified reference material results
   - laboratory duplicate and blanks results

Data evaluation

1. Comparison of field and laboratory data with the sampling rationale, including:
   - deviations from the SAPQ
   - acceptability of field QA/QC sample results
   - acceptability of laboratory QA/QC results
2. Evaluation of factors which may materially affect the results (such as the collection and analysis of samples by different personnel, different methodologies, spatial and temporal variations)
3. Implications precision, accuracy, representativeness, completeness and comparability of the data
4. Implications for the composition of the WDM and its capacity to meet the proposed/ agreed product specification.

Raw material comparators

Comparison of the WDM properties with a natural raw material product 'comparator' provides a simplified risk assessment approach (section 4.2.1). This outline of a SAQP above may be adapted for the purposes of characterising a natural comparator.

Samples of the selected comparator for analysis may come from a single source (e.g. a single quarry supplying limestone shell grit blocks) or a number of sources (e.g. all the limestone quarries serving the Perth metropolitan area) depending on the uniqueness/properties of the raw material and the proposed uses of the WDM.

Sufficient samples should be sourced to characterise the natural variation in the product. For example, the Environment Agency (2015) *Product comparator for construction materials: natural limestone aggregate* is based on a total of 20 natural limestone aggregate samples obtained from a variety of suppliers across England to

provide a cross-section of the main types of natural limestone aggregate used in construction.

Samples should be taken in accordance with an appropriate Australian Standard (or equivalent) such as *AS 1141.3.1-2012 Methods for sampling and testing aggregates – Sampling – Aggregates.*

Appendix C – Detailed risk assessment using a source – pathway – receptor approach

The source – pathway – receptor approach recognises that all factors must be present for a potential hazard to be considered an environmental risk. General information on this approach to risk management can be found in DER's guideline *Assessment and management of contaminated sites*, and references therein including the *National Environment Protection (Assessment of Site Contamination) Measure*.

A detailed risk assessment for a WDM must consider the potential direct and indirect risks posed by the WDM (or any constituent of the WDM) to public health and the environment, including from its deterioration or breakdown over time. If the WDM is claimed to be completely inert, this must be supported by evidence.

Depending on the nature of the WDM and the proposed use(s), a range of studies to assess the environmental behaviour (including mobility, bioavailability and persistence) of the WDM may be required, such as

- leachate testing;
- field trials; and/or
- human health and ecological risk assessment including contaminant fate and transport modelling.

Steps for a risk assessment using a source – pathway – receptor approach are set out below based on procedures outlined in Hjelmar *et al*. (2013) and Environment Agency (2014). The risk assessment steps are set out in a linear fashion; however, in practice the steps are generally carried out in an iterative manner until a solution is achieved that meets the combined needs of the applicant, land users and DER.

Step 1: Assess how the product will be used

Applicants should consider how their WDM will be used (Section 4.1.8), and the potential pathways and receptors for WDM emissions when undertaking a risk assessment. Restrictions on the proposed use may alter the level of risk associated with the WDM. For example, WDMs that are freely available for use by the public potentially pose a higher risk than WDMs used for a specific purpose on a limited number of sites by appropriately trained personnel.

Step 2: Identify the hazards, pathways and receptors associated with the use of the product

Prior to this step, the WDM should be characterised as set out at Section 4.1.6 and applicants should be able to identify potential contaminants of concern (chemical and/ or microbiological). The proposed use, and potential restrictions on use (Step 1 and Section 4.1.8) should have also been determined. In this step, applicants should determine what parts of the environment (including people) may be affected by the use of the WDM, and the potential pathways by which harmful constituents could be transported from the WDM to environmental receptors. This process is made easier by developing a conceptual site model which shows pathways and receptors.

Figure C1 shows an example of a site model for the use of a WDM as a soil amendment agent. In this particular scenario, it has been assumed that leaching of

chemical constituents through the soil profile and transport by groundwater flow are the dominant pathways for transporting chemical constituents from the product to receptors. Potential receptors include:

- pore-water at shallow depth in the soil profile which can be accessed by plant roots and soil fauna;
- groundwater immediately beneath the amended soil area; and
- offsite groundwater users, surface water bodies and deep-rooted vegetation that may be affected by the quality of groundwater that flows from the area where waste materials have been applied to soils.

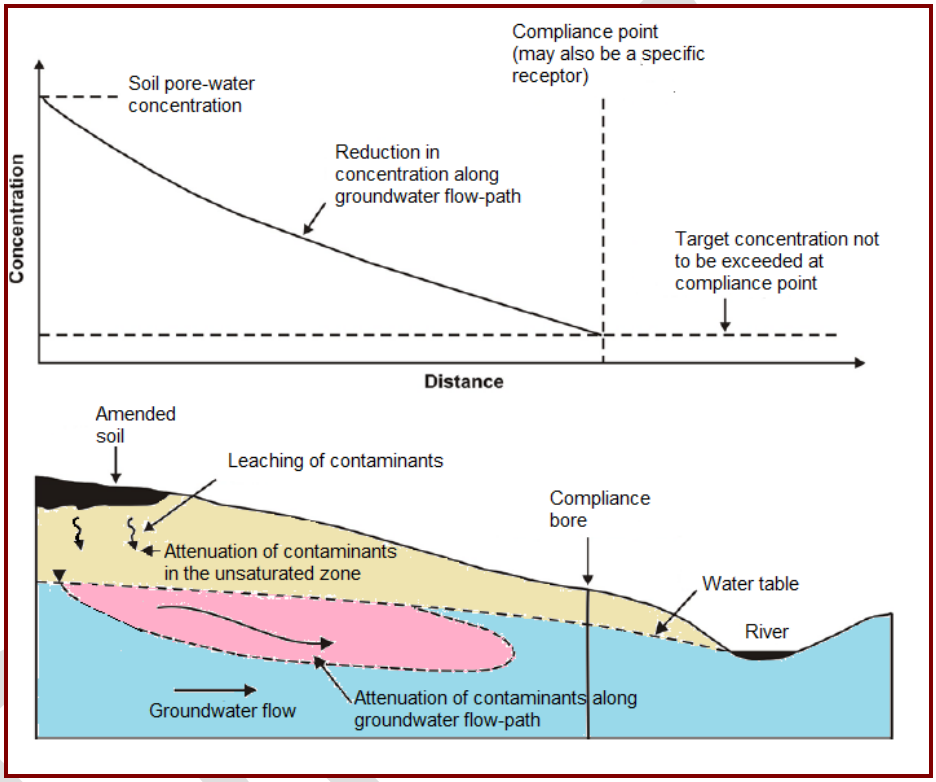

Figure C1 Conceptual site model for assessing the potential impacts of a waste-amended soil on environmental receptors via a groundwater pathway (adapted from Environment Agency, 2006)

The potential impacts on receptors are managed by ensuring that concentrations of potentially harmful chemical constituents remain below levels of environmental concern (assessment levels) in soil pore-water or in groundwater at the receptor. A "compliance point" (see Figure C1) may be established between the amended soil and the receptor to ensure that concentrations of the chemical constituent remain below levels of environmental concern. Information on how to identify appropriate assessment levels can be found in the DER guideline *Assessment and management of contaminated sites*.

The potential impacts on receptors can be assessed using modelling methodologies outlined in Environment Agency (2006). However, this work can only be undertaken if the concentration of chemical constituents in soil pore-water adjacent to the WDM (the source term) can be determined. This so-called "source term" for subsequent

modelling of the movement of harmful constituents in soil pore-water and groundwater must be determined by the use of leaching tests (Step 3).

Step 3: Determine the contamination source term

The potential impacts on receptors can be assessed using contaminant fate and transport modelling methodologies such as the *Remedial Targets Methodology: Hydrogeological Risk assessment for Land Contamination* (Environment Agency, 2006). However, this work can only be undertaken if the concentration of chemical constituents in soil pore-water adjacent to the WDM (the source term) can be determined. This so-called "source term" for subsequent modelling of the movement of harmful constituents in soil pore-water and groundwater must be determined by the use of leaching tests.

Leaching tests are widely used to determine the extent to which a chemical constituent may leach from a solid particle to a liquid phase in prolonged contact with the solid under specific chemical conditions. Currently, the most widely used leaching test procedure in Australia is the Australian Standard Leaching (ASLP) test. However, this leaching test procedure has limitations that make it unsuitable for assessing the use of WDMs, including:

- inability to simulate leaching under the wide range of pH values that may be present in the soil profile amended with a WDM; and
- inability to determine the rate at which constituents may be leached from a solid material under a range of conditions.

DER therefore recommends that the *US EPA Leaching Environmental Assessment Framework* (LEAF) leaching test procedures are used (see also Garrabrants *et al*. 2010).

Leaching tests should address the range of contaminants of potential concern identified in Step 2. The results should be compared with the most sensitive use of groundwater applicable to the WDM's proposed use. Where WDMs are used in urban areas, non-potable groundwater quality guidelines may be appropriate. In rural areas, the appropriate assessment levels may be for potable water use (Australian Drinking Water Guidelines) stock drinking water and/or irrigation water quality. Further information is available in DER's *Assessment and management of contaminated sites* and the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).*

Step 4: Determine the concentrations of contaminants at the compliance point

Leaching tests results can be used to determine the likely range of concentrations of chemical constituents at the compliance point using contaminant fate and transport modelling such as that outlined in *Remedial Targets Methodology: Hydrogeological Risk assessment for Land Contamination* (Environment Agency 2006).

As an example, if the compliance point is groundwater at the water table immediately beneath the site, the degree to which chemical constituents in soil pore-water are diluted by mixing with groundwater (assuming no attenuation within the soil profile) is given by the equation:

$$DF = 1 + \frac{(K.i.Mz)}{(L.Inf)}$$

Where:

DF = dilution factor
L = length of soil amended area in the direction of groundwater flow (Fig. 4)
i = hydraulic gradient for the site
K = hydraulic conductivity of the aquifer (m/d)
Mz = mixing zone thickness
Inf = infiltration rate

(See also Figure C2)

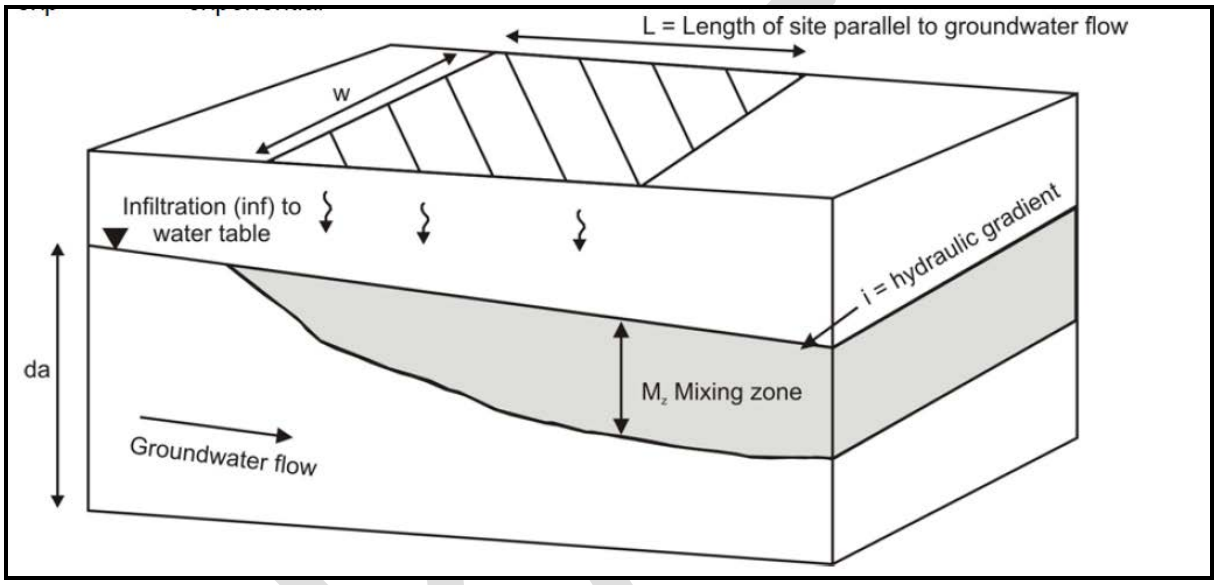

Figure C2 Dilution of a chemical constituent in pore water infiltrating from an area of amended soil into shallow groundwater

Step 5: Assess the impact on the receptor, and adjust the source term to ensure compliance

Based on the outcomes of the previous four steps, the applicant should assess whether the proposed use of the WDM is likely to achieve compliance with the appropriate assessment levels at the compliance point. If compliance is not achieved for one or more chemical constituents in groundwater at the compliance point, options available to the applicant include:

- changing the amount of product that is applied to soil;
- defining restrictions on the use of the product (for an example of this approach, refer to the restrictions on the application of biosolids to land in DEC (2012)) ; and
- changing the properties of the WDM-derived product to reduce leaching rates.

DER may require field trials for the proposed use scenarios for the WDM to ensure that the behaviour of the WDM as determined by laboratory leaching tests is reproducible under field conditions.

Field trials

Field tests should be undertaken in test plots in relevant soil types and at an appropriate scale where potential impacts on environmental receptors can be managed and where data obtained from testing will be statistically applicable to the proposed broad-scale use of the material. Field testing should consider the following factors:

- application rate of the WDM to soil;
- consistency of the properties of the WDM at the field scale;
- mixing depth in the soil; and
- effects of variations in soil properties on leaching behaviour.

Monitoring at the trial site should provide at least the following information:

- a comprehensive assessment of the water balance of the site over the duration of the trial including changes in rainfall, irrigation, evaporation and infiltration to the water table;
- changes in soil pore water quality beneath the field site both in the unsaturated zone and at the water table; and
- changes in the physical and chemical properties of the WMD modified soil during the duration of the trial.

The field trial should be conducted over a time period of sufficient duration to determine the effects of seasonal variations in the chemical properties of soil pore water beneath the site (i.e. over a period of at least one year).

References

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Hjelmar, O., van der Sloot, H.A., Coman, R.J. and Wahlström, M., 2013. EoW criteria for waste-derived aggregates. *Waste Biomass Valor*., 4, 809-19. Paper is available from website http://www.dhigroup.com/upload/publications/mouse/Hjelmar_2012.pdf.