

Strategic Environmental Assessment (SEA) for Shale Gas Development in South Africa:

SEA Process Document

This document has been drafted by the co-Leaders of the SEA, Prof Bob Scholes and Paul Lochner. The purpose of the document is to explain to stakeholders and project governance groups the process which will be followed by the project team when undertaking the SEA process.

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1. Background

CSIR, in partnership with the South African National Biodiversity Institute (SANBI) and the Council for Geosciences (CGS) have been appointed by the national Department of Environmental Affairs to undertake a Strategic Environmental Assessment (SEA) for Shale Gas Development in South Africa. The execution of this SEA is mandated by the South African cabinet, with the Department of Environmental Affairs (DEA) as the responsible department. The SEA was formally and collectively launched in the media by the national Department of Environmental Affairs, Science and Technology (DST), Mineral Resources (DMR), Energy (DoE) and Water and Sanitation (DWS) in Parliament on 12 May 2015. R12.5 Million has been allocated to the study and it will be 24 months in duration, starting 12 February 2015.

The mission statement for the SEA is to provide an integrated assessment and decision-making framework to enable South Africa to establish effective policy, legislation and sustainability conditions under which shale gas development could occur. Note that this mission statement, developed by the first meeting of the Project Executive Committee, is phrased in the conditional: it does not presume that shale gas development will occur. The point of departure for the study is that South African Government, through Cabinet and various other decision-making institutions, has made high-level public commitments to shale gas exploration. If the exploration phase yields successful hydrocarbon deposits and gas-flow regimes, it is a reasonable assumption that Government would seriously consider development of those resources at a significant scale. South Africa needs to be in a position to make the decisions relevant to that choice in a timely and environmentally responsible manner.

The cabinet has already approved the process for granting the first permits for shale gas exploration and the guidelines under which exploration drilling can take place have been gazetted in terms of the Minerals and Petroleum Development Resources Act, 2002 (Act 28 of 2002) GNR 466 on 03 June 2015 entitled "Regulations for Petroleum Exploration and Production". Actual deep-drilling and testing of the gas yields (if suitable gas-containing formations are found) is some time off. The SEA must be timeously completed so the regulatory environment governing exploration activities can be augmented if required and so that decisions on the next phase (full-scale gas development) can be evidence-based, when needed. This means that the assessment is based on a range of scenarios, ranging from 'exploration only' through 'minimal development' to 'maximal development', with a 'no shale gas exploration or development' scenario as a reference case.

The SEA will be conducted as an independent, science-based assessment, along the lines of the Intergovernmental Panel on Climate Change, adapted where necessary to conform to national circumstances, and taking into account the South African Guidelines for Strategic Environmental Assessment¹. The 'philosophy' of the SEA is based on global best practice in SEA theory and implementation. The SEA will undertake a 'scientific assessment process' that is grounded in transparency and participatory processes; in order to satisfy the principles of **legitimacy**, **saliency** and **credibility**.

¹ The IPCC does not have one, unified document which captures all its procedures. Many are codified in decisions of the plenary, others simply by practice. However, other assessments have written documents to guide their processes, strongly influenced by IPCC practice and academic studies of assessments. An example is the 'Handbook for Practitioners' developed by the Millennium Ecosystem Assessment by Ash et al (2010), available through the SEA document repository and freely available online.

The objective of the SEA is to inform the decision maker's (in this case the South African cabinet, and specifically the Ministers of Environmental Affairs, Water and Mineral Resources) understanding of the risks and opportunities of shale gas development, based on the evaluation by acknowledged experts of the best available information. It will translate information from South Africa and the world into a form usable by policymakers. It will be characterized by an extensive, transparent (i.e. in the public domain once the reviews have been received and the responses made) review process by both experts and stakeholders.

The SEA will consider both the exploration and production related activities of shale gas development (up to and including eventual closure of facilities and restoration of their sites) and will include an assessment of all the material social, economic and biophysical risks and opportunities of the industry. For more information, please visit the project website at <http://seasgd.csir.co.za/>

The key outputs that government requires from the SEA, in order to satisfy various regulatory mandates, are a spatial sensitivity analysis and limits of acceptable change for the various identified potential impacts; and a decision-making framework that could include aspects such as monitoring requirements, best practices and protocols for decision-making.

2. Study Area

The extent of the study area was informed by the areas currently under applications for Explorations Rights (by the operators Shell, Bundu, Falcon). In October 2014, the DMR Minister was quoted in parliament as saying "there are currently five (5) applications to explore for shale gas in the Karoo area. Applications were received from Falcon (x1), Bundu (x1) and Shell (x3). The applications have not been assessed and therefore no applications have been approved or refused". It was acknowledged that additional Technical Cooperation Permit applications have been submitted to the Petroleum Agency South Africa (PASA) in the last 4 years for desktop studies, but that many of these have expired. Considering that PASA's sweet spot reserve estimates are succinctly aligned with the current Exploration Right applications from Falcon, Bundu and Shell, this region represents the obvious area to initiate the first pass SEA process. The official shapefiles from PASA delineating the existing Exploration Rights applications were used to define the study area (with a 20 km buffer around existing Exploration Rights application areas). The study area includes 27 local municipalities and encompasses 171 811 km² (see Figure 1).

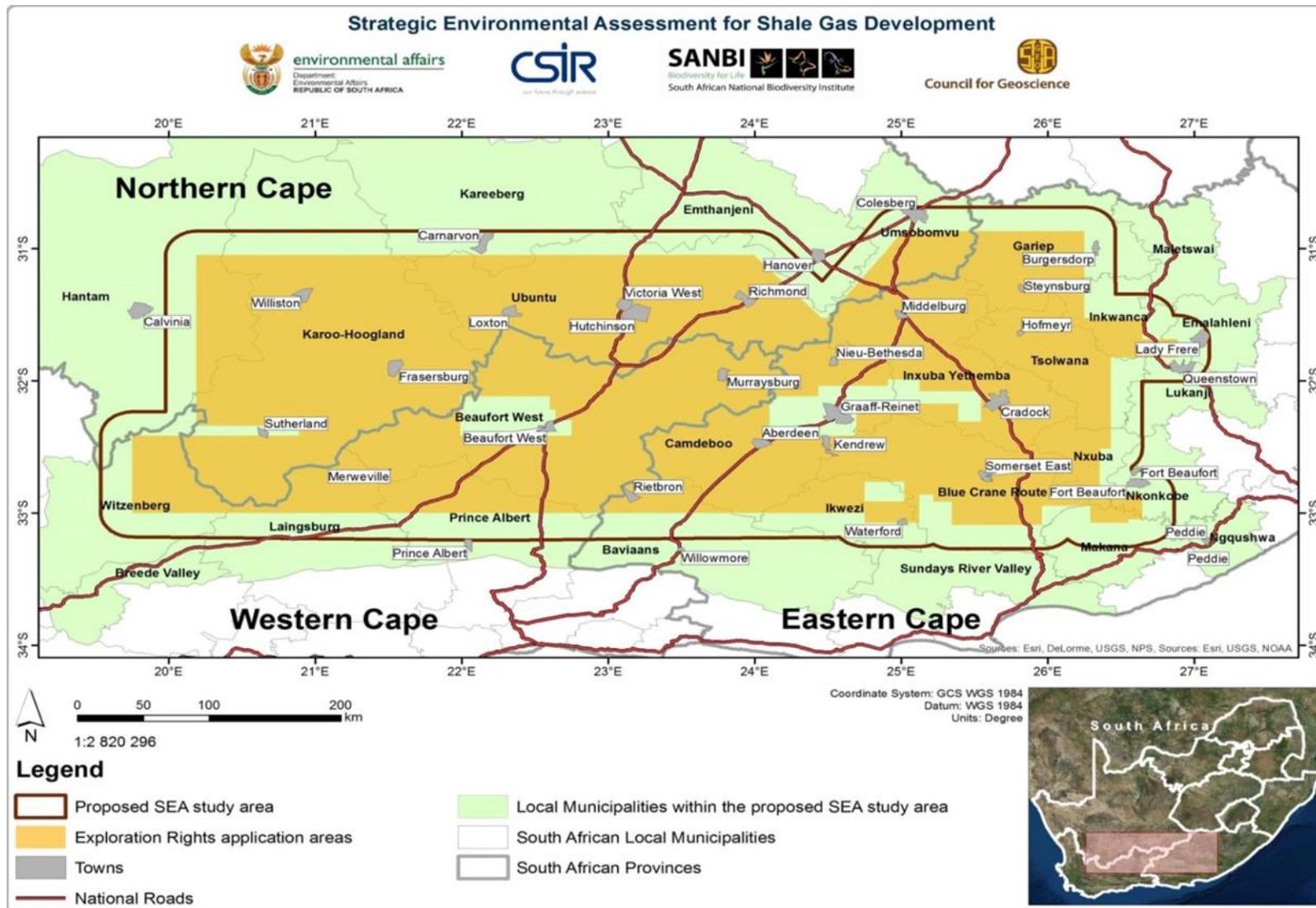


Figure 1: SEA Study Area

3. Phases of the SEA

The SEA has been designed in three overlapping phases (Figure 2).

Phase 1, beginning February 2015 and extending to about October 2015, includes the necessary preparatory arrangements: completing contracts and procurement arrangements, recruitment, convening the governance structures, collating literature and data, writing the first draft of the 'Scenarios and Activities' document (explained later in the document), identifying the proposed author teams, arranging logistics etc.

Phase 2 is the scientific assessment of the information by the multi-author expert teams, including two reviews of drafts of their assessment initially by independent experts, then by both experts and stakeholders. Phase 2 commences with the first author meeting 28 September 2015, and ends with the completed final assessment report a year later.

Phase 3 translates the assessment into operational guidelines and decision making frameworks (Figure 2 below). It is undertaken by the Project Team (CSIR, SANBI and CGS) in close consultation with the various affected Departments. It commences with initial drafts after the delivery of the first draft of the Assessment report, and with final drafts after the delivery of the final Assessment report. The separation of the teams between phase 2 and 3 is to honour the assessment 'mantra' of being 'policy relevant, but not policy prescriptive'. The experts in Phase 2 are not being asked to make decisions about the development of shale gas. They are being asked to give an informed opinion on the consequences of different options. The decisions must be made by mandated authorities (i.e. government), who have contracted the science councils to help them in formulating the framework and content of such decisions. The detailed schedule of activities is shown in Figure 3.

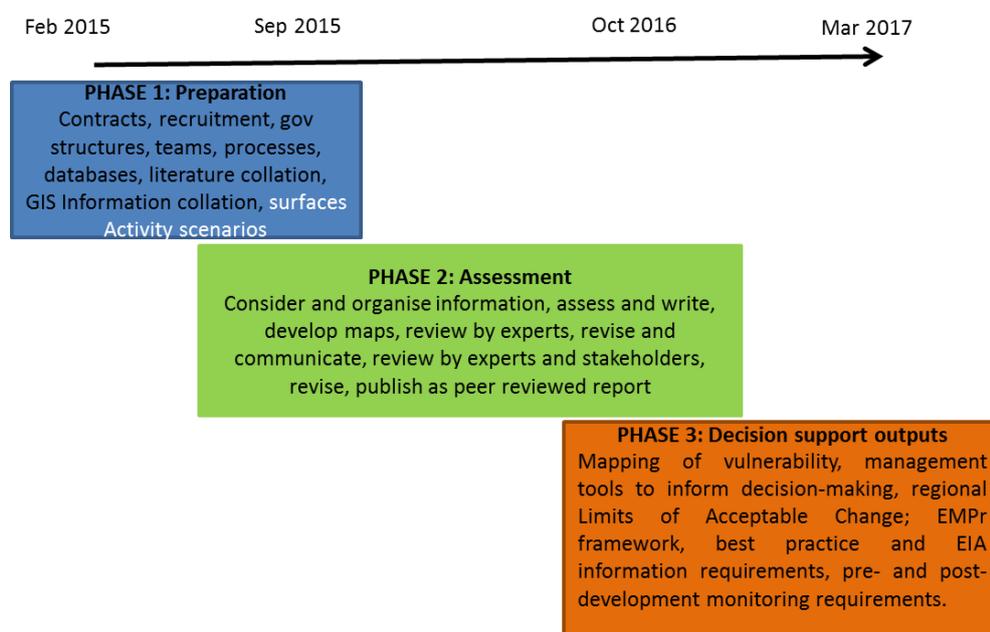


Figure 2: SEA Phases

4. Governance of the SEA

The governance structure for the SEA is illustrated in Figure 4:

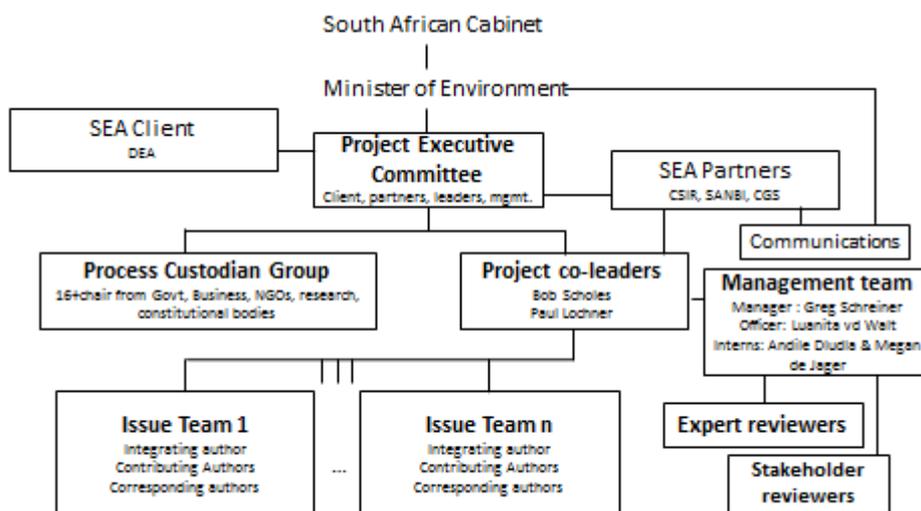


Figure 4: Governance structure for the SEA of shale gas development

4.1. Project Executive Committee (PEC)

The PEC consists of representatives (and their alternates if they are unable to attend) of the authorities commissioning the SEA, and those who will be the main users in government.

Key responsibilities of the PEC include:

- Ensuring that the project remains on scope, timelines and budget
- Checking that strategic and policy level questions are addressed sufficiently
- Evaluating feedback from the Process Custodians Group (PCG) as required
- Coordination and conduit of information

The PEC includes representatives of the project team (CSIR, SANBI and CSG) in order to brief the committee, elaborate on issues, and communicate decisions to the executants. The PEC composition is shown in Table 1:

Table 1: Project Executive Committee members

Representing	Member Name	Alternate
Department of Environmental Affairs (Chair)	Dee Fisher	Surprise Zwane
Department of Water and Sanitation	Mkhevu Mnisi	Bayanda Zanzile
Department of Mineral Resources	Mosa Mabuza	-
Department of Energy	Muzi Mkhiza	Mmarena Mphahlele
Department of Science and Technology	-	-
Department of Agriculture, Forestry and Fisheries	Lydia Bosoga	Mary-Jean Gabriel
Provincial Government Eastern Cape	Alistair McMaster	Gerrie Pienaar

Representing	Member Name	Alternate
Provincial Government Western Cape	Paul Hardcastle	Henri Fortuin
Provincial Government Northern Cape	Bryan Fischer	Natalie Uys
CSIR	Bob Scholes and Paul Lochner (SEA co-leaders)	-
SANBI	Jeff Manuel	Kristal Maze
CGS	Henk Coetzee	V.R.K. Vadapalli
Secretariat	Greg Schreiner (Project Manager) Minute keeper supplied by CSIR (Luanita van der Walt)	

The PEC meeting dates, subject to confirmation, are:

- July 2015, October 2015, May 2016, September 2016 and March 2017

4.2. Process Custodians Group (PCG)

A key innovation in this assessment, designed to ensure that it is independent, thorough and balanced, is a PCG of 16 eminent people, drawn approximately equally from government, NGOs, the private sector and the research community. The PCG will meet at key junctures during the assessment to ensure that the *process* has been fair and rigorous. They have no say on the content. Their specific responsibilities are to evaluate and report to the PEC on the following topics:

- Has the assessment process followed, within reason, the guidelines set out in this document;
- Do the author teams have the necessary expertise and show balance between well-founded ranges of opinion;
- Does the assessment (as indicated by the Zero Order Draft i.e. the expanded outline and then by the first and second draft contents) cover the material issues;
- Are the identified expert reviewers independent, qualified and balanced;
- Have the review comments received from expert and stakeholder reviewers been adequately addressed and have the responses been adequately documented (especially in the case where a review comment is partially or fully rejected).

The PCG generally meets immediately before the PEC, since they report to the PEC on the above topics and the PEC acts, if necessary and appropriate, on their findings, among its other duties. The PCG operates as far as possible on a consensus basis. Where agreement cannot be reached, a majority and one or more minority reports can be submitted. The reports of the PCG will be in the public domain. The composition of the PCG is shown in Table 2:

Table 2: Process Custodians Group members

Sector	Organisational home of member	Member name	Alternate
Chair	IAIA-SA	Sean O'Bierne	-
Government	Department of Performance Monitoring and Evaluation	Rudi Dicks	Nkhensani Golele
Government	PetroSA	Jessica Courtoreille	Portia Manuel
Government	South African Local Government Agency	Intelligent Chauke	-
Government	Department of Economic Development	Andrew Matjeke	Khathutshelo Sikhitha
Business	AgriSA	Waymann Kritzinger	Nic Opperman
Business	Onshore Petroleum Agency	Peter Price	Lizel Oberholzer/

Sector	Organisational home of member	Member name	Alternate
	South Africa		Jane Blomkamp
Business	Business Unity South Africa	Marius Diemont	Laurel Shipalana
NGO	Treasure the Karoo Action Group	Jeanie le Roux	Jonathan Deal
NGO	World Wide Fund For Nature -SA	Morné du Plessis	Louise Scholtz
NGO	South African Faith Communities Environment Institute	Stefan Cramer	-
Research	Water Research Commission	Shafick Adams	Jo Burgess
Research	Human Sciences Research Council	Demetre Labadarios	Temba Masilela
Research	Square Kilometre Array	Selaelo Matlhane	Adrian Tiplady
Research	Nelson Mandela Metropolitan University	Maarten de Wit	Moctar Doucoufè
Constitutional Body	South African Human Rights Commission	Janet Love	Chantal Kisoon

* Note that the South African non-Governmental Coalition (SANGOCO) and South African Tourism Services Association (SATSA) declined positions on the PCG.

The organisations from which the members were sourced were selected by the PEC as having credibility in their 'sectors' through having a mandate or a large following, and a demonstrated interest in the topic of shale gas development. Members of the PCG are not appointed as 'representatives' of their organisation in a narrow sense; but are expected to reflect the breadth of opinion in their sectors. PCG members are encouraged to nominate an alternate if they are unavoidably unable to attend a meeting, but not to send different people at every meeting. Membership of the PCG disqualifies the members themselves from being SEA authors or expert reviewers, but does not disqualify their organisations from providing authors, expert reviewers or stakeholder review comments. Nor does it in any way preclude those organisations from other avenues of expressing their opinions on shale gas development through, for example, advocacy, media engagement or legal action. The PCG (nor the PEC, nor the SEA overall) is neither 'approving' nor 'disapproving' shale gas development, but simply helping ensure that the information relating to shale gas development is collected, summarised and communicated in a comprehensive and unbiased way.

The PCG meeting dates, subject to confirmation, are:

- July 2015, October 2015, May 2016 and September 2016

The PCG can, if needed, have discussions and reach conclusions based on email or teleconference modes in-between these physical meetings and the chair can convene further meetings if he deems it necessary to meet the PCG mandate.

4.3. Multi-Author Teams

In order to advance the principles of balance and comprehensiveness, the main topics in the assessment will be addressed by multi-author teams (rather than the approach often applied in EIAs of using a single consultant). Each of the Strategic Issues (e.g. Water, Economics, Geophysics, Social Fabric etc.) will have a team of four to six authors (including the Integrating Author, but excluding Corresponding Authors), selected on the basis of their acknowledged expertise.

Expertise will usually be evidenced by appropriate formal qualifications and experience, but may also be evidenced by widespread peer-group agreement that the candidate has expertise on the topic and by a track record of outputs on the topic, widely acknowledged to be of value. Authors can be drawn from a broad range of sectors, including research

institutions, government, NGOs, universities, business, etc. and across different regions of South Africa and if appropriate abroad, to ensure a balance of interests, disciplinary background, experience and perspective is represented in the team.

Each team includes one (in some cases two or three, where the topic has clear subtopics) Integrating Author (Convening Lead Authors in IPCC parlance; the name was adapted to the South African SEA Guideline terminology), several Contributing Authors (Lead Authors under IPCC) and potentially many Corresponding Authors. The latter do not attend writing meetings, but provide small amounts of text on defined, relatively narrow topics, via email.

Thus it is anticipated that the assessment will include approximately 60-70 authors, not including Corresponding Authors. All the authors will be listed on the topic head, in alphabetical order within each category: integrating authors first, then contributing. Corresponding authors are acknowledged, rather than listed as authors for citation purposes. The various types of authors and reviewers, their roles and the PCG role with respect to their selection are summarised here:

Table 3: Roles and responsibilities of authors, reviewers and PCG members

Role	Responsibility	PCG role
Integrating Author (1-2 per Strategic Issue). Expenses plus token stipend for acknowledging time investment	Chairs the team meeting discussions, allocates writing tasks, ensures they are done on time and to specification, allocates reviewer response tasks, ensures they are done. Experienced expert in own right, part of overall summary/synthesis team.	Approves Integrating Author selection based on expertise, experience, credibility, availability.
Contributing Authors (3-5 per Strategic Issue). Expenses only, modest honorarium fee for self-employed	Collate, evaluate and summarise available information. Lead writer of an allocated section, participates in team discussions on entire topic and takes collective responsibility for it. Responds to reviewer comments in allocated section and revises drafts accordingly.	Approves Author Team based on expertise and balance, can suggest authors.
Corresponding Author (no limit: as needed) No fee	Provides short input text on area of narrow or special expertise. May be asked to respond to reviewer comments on the material provided.	Notified of corresponding authors.
Expert reviewer (>3 per issue) No fee, many are international experts	Reads first and second draft and provides written, specific and evidence-based, referenced comments.	Approves list of expert reviewers, can suggest names, checks that their comments have been taken into account appropriately.
Stakeholder reviewer (no limit) No fee or entry barrier	Reads second draft and provides written, specific comments. The degree to which they will be taken into account in the final draft depends on the evidence supplied and its credibility.	Checks that stakeholder comments have been taken into account appropriately.

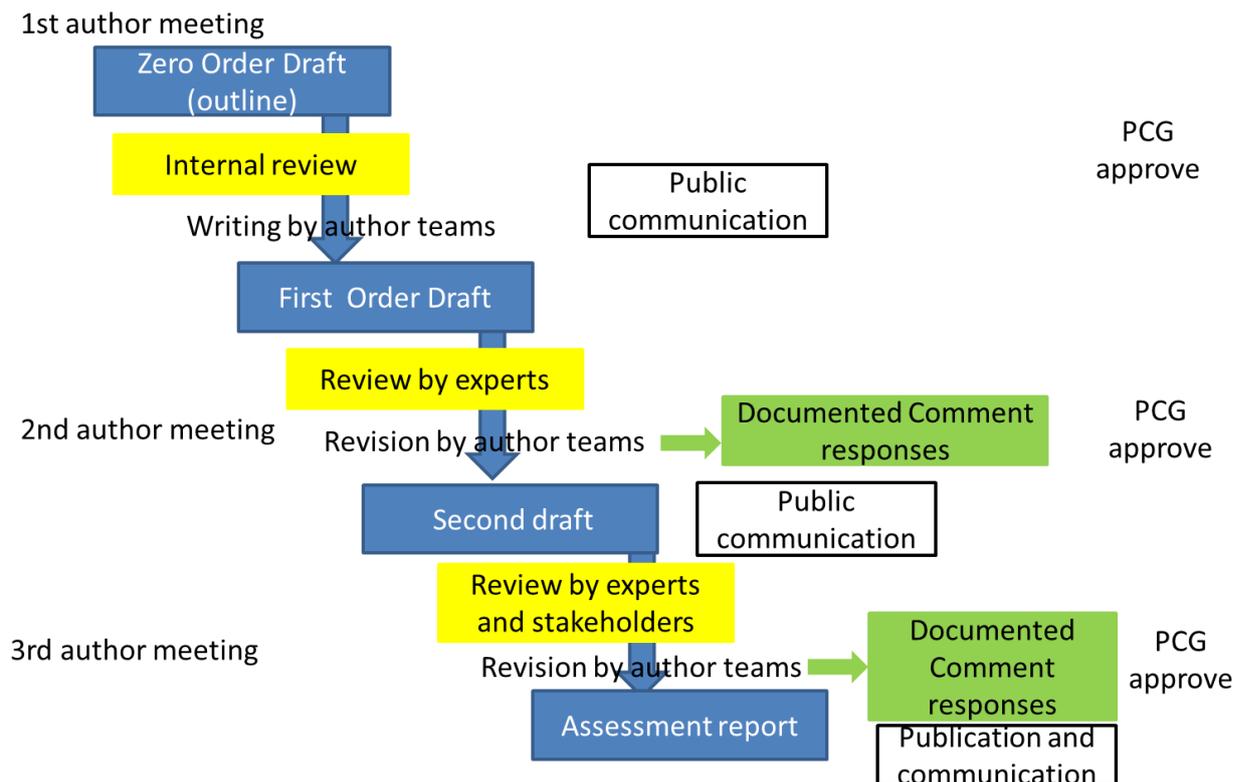


Figure 5: Writing and review process

Remuneration of authors is based on covering expenses rather than at a level that could be reasonably construed to constitute an inducement to give a biased finding. This is standard practice for an assessment of this nature, such as IPCC or IPBES, or in South Africa, the Scientific Assessment of Elephant Management. A partial exception is made in the case of Integrating Authors (in recognition of the significant time investment they must make, see below) and, following individual agreement, with Contributing Authors who are self-employed.

Each topic chapter will be a published, citeable, peer-reviewed output for those authors who need to demonstrate publication outputs for subsidy-earning or career progression reasons.

Authors do not represent their home organisations or any particular constituency. They are selected on a personal basis, reflecting their individual capacity to contribute to the assessment. Their mode of interaction is expected to be collegial, collaborative and inclusive, and the team should base its collective text and judgements on the best available evidence.

Three multi-author team workshops of about three days each will be scheduled during the assessment. The workshops will provide the opportunity to discuss the approach to the assessment, inter-topic issues, intra-topic issues and the delivery of key assessment outputs.

4.3.1. Integrating Authors

The Integrating Authors will be responsible for ensuring that all the components written by Contributing and Corresponding Authors are delivered on time, and are incorporated in a logical fashion into the Strategic Issue chapter; and that the scope of the Strategic Issue, as decided at the first workshop, is covered.

Integrating Authors need to ensure that the responses to comments from stakeholders and reviewers have been adequately addressed and / or incorporated and documented. The Project Team will be responsible for collecting and managing the comments in an electronic database and distributing these to the Multi-Author Teams via the Integrating Authors.

Remuneration for the Integrating Authors will be based on a contribution to their time costs. It is estimated that they will need to spend up to four weeks (distributed over an 18 month period, beginning September 2015) leading the Strategic Issue; including attending the three writing meetings of three days each; collating and integrating the contributions from other authors, managing the review processes and redrafting and comment documentation that results from it.

Thus, they will be allocated a stipend for their time in addition to having disbursement costs (travel to meetings, accommodation, food) covered. The stipend allocated to the Integrating Authors will be in the region of R 60 000 – R 120 000 (excl. VAT), depending on the size of the Strategic Issue they are addressing and the number of Integrating authors appointed to that issue.

4.3.2. Contributing Authors

Contributing authors are expected to attend all three writing workshops and actively participate in the discussions and decisions there. They must deliver text, references, tables and graphics (in rough form) to their Integrating Author by the agreed date, and according to agreed formats and templates. They must assist in addressing reviewer comments (especially those relating to text they have contributed) and writing the second draft. They must assist in addressing the stakeholder and expert comments on the second draft and final draft, especially on their sections. Contributing Authors will not be allocated a 'time stipend', but will have their disbursements covered from the project. The time requirement is probably about 15 days over the course of 18 months.

4.3.3. Corresponding authors

Corresponding Authors typically write less than one published page (often a box, a table, illustration or a few paragraphs). They must deliver text, references, tables and graphics (in rough form) to their Integrating Author by the agreed date, and according to agreed formats. They may be requested to assist in addressing reviewer comments relating to text they have contributed. Corresponding Authors do not attend the writing meetings and receive neither a 'time stipend' nor travel costs. The time requirements are likely to be a few hours to a few days. They are acknowledged on the title page of the issue chapter.

4.4. The Project Management Team

The Project Team, based at CSIR in Stellenbosch is managed by Greg Schreiner (gschreiner@csir.co.za), Luanita van der Walt (LvdWalt1@csir.co.za) and several other colleagues. The Project Team will handle 1.) All logistics associated with the meetings, including those of the PCG; 2.) The management and style editing of documents leading to the first, second, and final drafts; 3.) The preparation of graphics in a publication-ready form; 4.) Appointment of Expert Reviewers and communications with them; 5.) Maintenance of databases relating to the SEA, including a large library of relevant literature, and the review process; and 6.) Any financial or contractual issues.

There are contact people in the other partner organisations as well: contact Jeff Manuel (J.Manuel@sanbi.org.za) at SANBI and Henk Coetzee (henkc@geoscience.org.za) at Council for Geosciences.

The co-leads of the Assessment, Prof Bob Scholes (bob.scholes@wits.ac.za) and Paul Lochner (plochner@csir.co.za), are available to all assessment participants for advice or problem-solving. A co-lead arrangement is common in assessments, since it adds a redundancy safety-net and helps to mitigate individual bias.

The Project Team is able to provide GIS-based spatial analysis support to the authors, for the Strategic Issues where this is required.

The Project Team has created and will maintain an on-line library of relevant baseline information and research material that can be accessed by the multi-author team. Access is password protected because some of the material is protected by copyright and therefore cannot be put on an open site. Authors are encouraged to submit material to the site if it is of interest beyond their sole use. 'Grey literature' which is cited in the assessment but is not easily publically available must be submitted for the record.

5. Strategic Issues: The Content of the Assessment

Based on existing literature and public concerns, the Strategic Issues listed below have been preliminarily identified. The exact names of the issues may change.

Table 4: Preliminary Strategic Issues

1.)	Terrestrial biodiversity	11.)	Noise
2.)	Water Resources (surface and ground water, including aquatic biodiversity)	12.)	Electromagnetic Interference
3.)	Geophysics (including seismicity)	13.)	Heritage Resources
4.)	Economics	14.)	'Sense of Place'
5.)	Spatial Planning and Infrastructure	15.)	Agriculture
6.)	National Energy Planning	16.)	Tourism
7.)	Waste Planning and Management	17.)	Human Health
8.)	Air Quality and Greenhouse Gases		
9.)	Social Fabric		
10.)	Visual		

The expanded table of contents for each issue will emerge from the first writing meeting at the end of September as the 'Zero Order Draft'. Each issue will generally have the following sections:

- Summary of key points, including degree-of-certainty terms.
- Definition of issue scope and key terms.
- Description of the mechanisms by which impacts (positive and negative) are generated, and their spatial and temporal distributions. This section is informed by international studies and local information, in relation to the various scenarios and their technology variants.
- The results of a structured risk assessment which evaluates the impacts, with and without mitigation, and in relation to specified limits of acceptable change, and
- Best practices for shale gas development and its monitoring in relation to the issue.

The Zero Order Draft will be considered by the PCG (in relation to materiality and balance) and the PEC (in relation to addressing the contractual needs); and revised if necessary by the Integrating Authors in an iterative process until 'sufficient consensus' is reached, leaving sufficient time to write the 'First Order Draft' before its due date.

Each Strategic Issue will be written to a given length target, nominally around 20 printed pages including figures but excluding references (which translates to around 12 000 words). The issues may not all be of equal length; guidelines will emerge from the first writing meeting. Where required, detailed supplementary material such as high-resolution maps (spatial analysis outcomes) will be appended to the report but not counted towards the word-length.

6. Risk Assessment

The risk assessment approach takes its point of departure from the fact that there is residual uncertainty about all aspects of the future, even after that uncertainty has been constrained by rigorously assessing the evidence. The risk assessment, which is based on a transparent expert judgement process, is an approach for considering all aspects of an issue in a common way, and in a spatial context.

It is based on an interpretation of existing spatial and non-spatial data in relation to the proposed activity, to generate an integrated picture of the risks related to a specified activity in a given location, with and without mitigation. Risk is assessed for each significant stressor (e.g. physical disturbance), on each different type of receiving entity (e.g. the rural poor, a sensitive wetland etc.), qualitatively (undiscernible, very low, low, moderate, high, very high) against a predefined set of criteria.

Every Strategic Issue team will be required to conduct a risk assessment in relation to its issue, starting in the first draft, and refining the assessment in subsequent drafts as a result of expert and stakeholder comments and other inputs. The risk assessments will be conducted using standard approaches and terminology to improve the consistency across issues. The risk assessment will be spatially explicit to the extent that risk driver data is spatially available, and will be done for the three activity scenarios and the reference case (no shale gas exploration or development), and with and without mitigation. The 'with mitigation' options will form the basis of the 'best practice' descriptions in the chapter, which will later form the basis of the guidelines developed from the assessment.

The following definitions have been adopted from the IPCC (AR5 WG2 chapter 19):

Hazard: The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources.

Risk: The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk results from the interaction of vulnerability, exposure, and hazard. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts, if these events or trends occur.

Risk = (Probability of Events or Trends) × Consequences

The steps in the SEA risk assessment are

1. Identify a preliminary list of 'key risks'. These are risks potentially important enough, in relation to the strategic issue under consideration and following shale gas development, to require a specific intervention such as a requirement for a specific technology or procedure, or a limitation in certain areas (up to and including a complete ban). The identification of risks can be based on the experience in other countries, the literature, the opinion of the chapter authors based on their South African experience, or broad public concerns (whether justified or not – the risk assessment will reveal that). The first list can be shortened or expanded later, as a result of iterations of the risk assessment process.
2. Formulate the 'Limits of Acceptable Change' for the impacts potentially induced by the hazard. These limits are ultimately based on social values, for which your informed expert opinion forms a proxy. How much change with respect to that hazard is the South African society as a whole willing to accept? These values may in some

cases be underpinned and substantiated by formal agreements, such as standards for air and water quality, laws such as those protecting heritage sites or biodiversity or international treaties such as on climate change. The limits used must be clearly specified and justified in the chapter text.

3. For each key risk, and under each scenario, estimate the risk class separately for each substantively different spatial circumstance. The spatial depiction of this, combining hazard exposure with receiving environment sensitivity, can be done with help from GIS specialists in the CSIR management team. Risk combines the likelihood of it occurring during the period appropriate to each shale gas development scenario and at the magnitude for which you are evaluating consequence; and the consequences, if it does occur. Use the figure for guidance, and then check your category against the definition for the class in the table. The consequences depend on exposure and the sensitivity (vulnerability) of the receiving environment to that particular hazard.
4. For each key risk, re-estimate the risk assuming the application of best practices consistent with the best practices documented in your issue chapter.

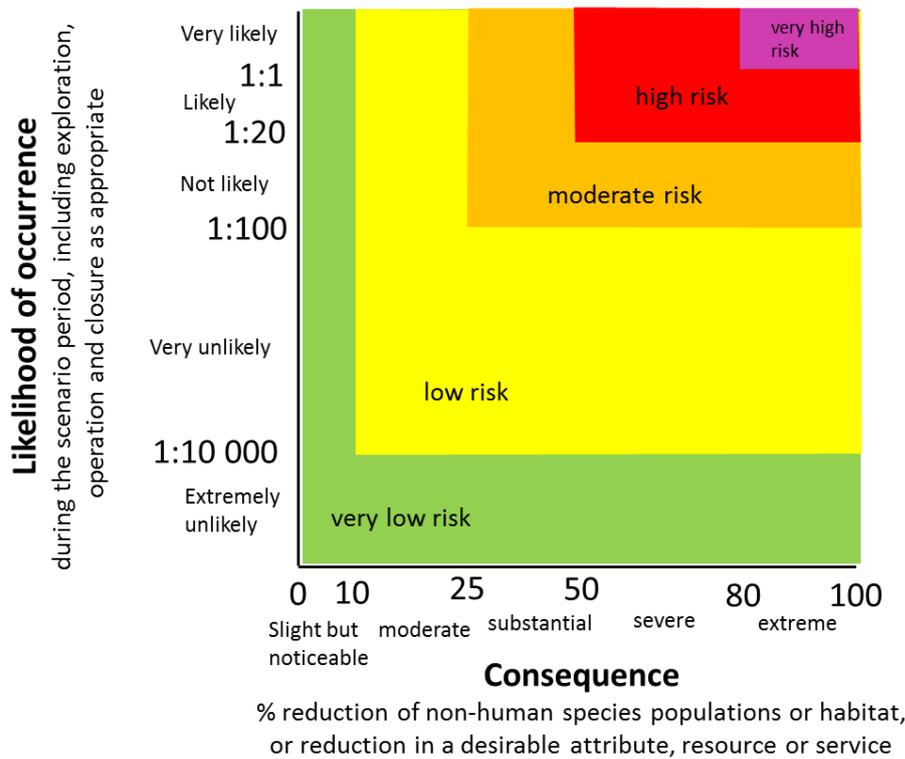


Figure 6: Guide to assigning risk levels in relation to likelihood and consequence. Table 5 with risk definitions takes precedence.

Table 5: Definitions of risk categories

Risk category	Definition
No discernable risk	Any changes that may occur as a result of the activity either reduce the risk or do not change it in a way that can be differentiated from the mean risk experienced in the absence of the activity.
Very low	Extremely unlikely (<1 chance in 10 000 of having a consequence of any discernable magnitude); or if more likely than this then the negative impact is noticeable but slight, i.e. although discernably beyond the mean experienced in the absence of the hazard, it is well within the tolerance or adaptive capacity of the receiving environment (for instance, within the range experienced naturally, or less than 10%); or is transient (< 1 year for near-full recovery).
Low	Very unlikely (<1 chance in 100 of having a more than moderate impact); or if more likely than this, then the impact is of moderate consequence because of one or more of the following considerations: it is highly limited in extent (<1% of the area exposed to the hazard is affected); or short in duration (<3 years), or with low effect on resources or attributes (<25% reduction in species population, resource or attribute utility).
Moderate	Not unlikely (1:100 to 1:20 of having a moderate or greater impact); or if more likely than this, then the consequences are substantial but less than severe, because although an important resource or attribute is impacted, the effect is well below the limit of acceptable change, or lasts for a duration of less than 3 years, or the affected resource or attributes has an equally acceptable and un-impacted substitute.
High	Greater than 1 in 20 chance of having a severe impact (approaching the limit of acceptable change) that persists for >3 years, for a resource or attribute where there may be an affordable and accessible substitute, but which is less acceptable.
Very high	Greater than even (1:1) chance of having an extremely negative and very persistent impact (lasting more than 30 years), greater than the limit of acceptable change, for an important resource or attribute for which there is no acceptable alternative.

7. Scenarios and Activities Document

A document describing several 'scenarios' and specifying the activities (type, extent, spatial location, intensity, duration and options) associated with each scenario will be available to the Authors. It will describe, in as much detail as is feasible, the activities anticipated to be associated with exploration, limited gas development, and extensive gas development. This document serves as a common point of departure for the Strategic Issue chapters to then estimate the associated impacts, with and without mitigation. For this reason it starts ahead of the other Strategic Issue chapters, and the First Order Draft will be made available to the Strategic Issue authors at their first author meeting. It will go out for expert review at the same time, and be revised (as a Second Order Draft) by end 2015. Thereafter the document will continue on the same timeframe as the rest of the issues, through stakeholder and expert review and final draft. It will be published as a preface to the rest of the issue chapters.

The conceptual range of 'scenarios' is shown in Figure 7.

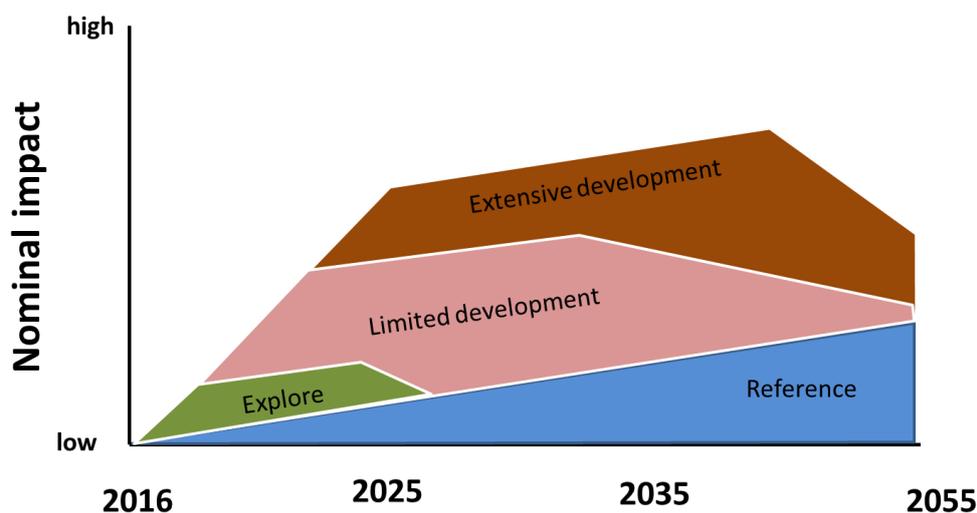


Figure 7: The four conceptual 'scenarios' to be developed. The 'Reference' includes changes which are projected to occur in the study area regardless of whether shale gas development occurs or not; due to planned infrastructural developments, ongoing land use and population trends and climate change, for instance.

8. Review Process

The First Order Draft of each of the Strategic Issues written by the Integrating, Contributing and Corresponding Authors will contain full (but not final) text, tables, and references and draft figures. It will be sent out for review by the SEA management office as a page-and-line numbered PDF file. Review will be by three or more expert reviewers per issue, nominated by the Project Team, with the approval of the Process Custodians Group. Expert reviewers may not be authors. Expert Reviewers will come from National Departments, Provincial Environmental Authorities, District and Local Municipalities, NGOs, Community-Based Organisations (CBOs), and academic and research institutions. They can be from South Africa and abroad; a key source will be experts volunteered by partner countries with shale gas expertise, such as the USA, the United Kingdom, Canada, Australia etc.

The expert reviewers will provide comments on the First Order Draft. The comments will be submitted via the SEA website by a given deadline, and will take the format of a structured database (a spreadsheet) with each comment as a separate row, and with the following columns: issue, page begin, line begin, page end, line end, comment. The Expert Review submissions are collated and sorted by issue, page and line number by the SEA management office and sent to the author teams prior to the second author meeting. The authors discuss their responses there, agree on changes to be made to the text and allocate responsibilities for doing so and documenting the response in the comments database.

Responses need to be sufficiently descriptive for the PCG to be able to trace them in the text or understand the basis on which they have been rejected. Thus, simply saying 'accepted' or 'rejected' is not enough. 'Text based on the comment has been included in section 2.3.2' would be sufficient, as would be 'The comment has been considered but has not resulted in text change because after review of the evidence provided, it was found to not be applicable to the South African situation'. The criterion applied by the PCG in deciding adequacy of the response is that the authors applied their mind to the comment in an unbiased way. Responses which fail this criterion, by majority agreement in the PCG, go back to the authors (via the SEA management and the Integrating Authors) for revision until a satisfactory solution is found.

The revised draft (Second Order Draft) goes back to the same experts. At the same time it goes out for broad stakeholder review. The comment provision and response mechanism is the same as for the First Order Draft.

The completed comment and response database will be placed in the public domain.

8.1. Reviewers

Reviewers must make comments within a stipulated timeframe on the First Order Draft of a particular issue. They are free to look at (and comment on) other Strategic Issues, but this is not an expectation. They must comment in a constructive way using the stipulated format (page and line range, a specific and actionable comment, backed up where appropriate with references or evidence). Reviewers will not be allocated a 'time stipend', or travel costs. The reviewing is likely to take one to two days. Designated expert reviewers will be acknowledged on the title page of each Strategic Issue chapter.

The broad stakeholder community, which is anticipated to include many organisations in civil society, business and government and does not exclude organisations outside of the focus region or South Africa, will comment on the Second Order Draft of the assessment via the same structured web-based process described above. Their comments will be individually addressed by the authors in a documented, public domain database, and incorporated where appropriate in the final draft. The weight which will be attached to their comments will depend on the evidence which they supply and the degree to which they represent a significant community of stakeholders rather than an individual view. The full list of people and organisations providing comment will form an addendum to the assessment report.

9. Briefings and outreach rounds

The SEA is an evidence-based scientific assessment process, using expert knowledge within rigorous and transparent peer-reviewed processes. It is undertaken to inform decisions at a national scale, based on an understanding of the broad issues and risks, sensitivities and regional thresholds in the study area. The SEA is not a research project or public relations exercise – it operates to strict timelines and deliverables.

It is also not an Environmental Impact Assessment (EIA) in the narrow sense of that phrase defined in terms of the NEMA regulations. This SEA in no way substitutes or replaces the requirement for downstream site-specific EIA processes, though it will help to define their content. Such EIAs would include public participation processes as expected by the NEMA. The EIA process is far better equipped to manage participation and local consultation, since by that stage there is a clear project description with listed activities, timeframes and locations which identify affected landowners and neighbours.

Thus the public briefing meetings to be held by the SEA have not been designed in the way they are conceived in the NEMA EIA process. The purpose of the public briefings is not to capture concerns, objections and support in a 'town-hall' fashion (e.g. through a scoping exercise), but to inform people of the SEA process, its preliminary findings and explain the mechanisms available to them for engaging in the process. These include:

- Following outputs and progress on the public project website, and using its open commenting facility to make suggestions, provide evidence or references, indicate issues of concern or names and contacts of persons who might be suitable as expert or stakeholder reviewers.
- Commenting on the Second Order Draft Assessment. All formally submitted comments will be responded to in an appropriate manner. Formal comments must be specific, clear, supported by evidence and attributable (i.e. not anonymous or confidential).
- Engaging with representatives of their interests who have been selected to be on the PCG if they have process-related issues.

Since the primary mechanism of substantive engagement is internet based, special provision will be made to facilitate access by individuals and communities with poor or no internet

access or skills. This will take the form of individuals appointed to act as internet facilitators, able to gather the concerns of the stakeholders and convert them into an electronic record for submission to the website, and provide feedback through an appropriate mechanism such as a written letter, phone call or SMS.

There will be two rounds of open public briefings in the study area. One round will be undertaken after the first Multi-Author Team Workshop. Three public briefings are planned in November 2015. The second round of briefings will be undertaken following the Second Order Draft around May 2016. It is likely that briefings will be held in Beaufort West (Western Cape), Victoria West (Northern Cape) and Graff-Reinet (Eastern Cape). Authors, PCG and PEC members are not expected to attend the briefings, but may do so if they wish. The briefings will be delivered by the SEA co-leaders and the Project Management Team, including project partners.

The Project Team will apply for funding to develop educational materials such as explanatory videos with narration and animations which help to explain the SEA process. These could be shown at the briefing meetings and distributed as widely as possible – into schools, libraries and universities. Universities and schools will also be involved in data collection in the SEA process via the SANBI Bioblitz. During a Bioblitz, experts and members of the public work together to survey a natural area, seeking, identifying and recording as many species as possible in a single day. Not only qualified experts take part in the Bioblitz; but it is open to students, scholars and the general biodiversity enthusiast. Some of the baseline data gathered during the Bioblitz will inform the Biodiversity and Water Resources Strategic Issue.

There is no onus on the Project Team to respond to *ad hoc* meeting requests or other communication or participation events which have not been planned as part of the SEA process. The Project Team will use their own discretion when deciding which meetings, conferences, workshops etc. will be attended. Requests of this nature will be evaluated on a case-by-case basis.

10. Public Statements and Document Confidentiality

The participants in the assessment, including authors, reviewers, PEC and PCG members, are not required to be silent or secretive on any issue related to shale gas exploration or development, either during or after the assessment. Most of the material will be in the 'public domain' (typically via an open website) as soon as it is finalised (minor exceptions relate to copyright information, ethically-protected information, or sensitive information such as the location of rare species). However, the contents of the assessment are not valid and official until the final draft has been approved by the PEC. Thus any material 'leaked' prior to this has no legitimised meaning, and SEA participants are discouraged from doing so beyond the necessity of consultation with colleagues.

Material supplied via the SEA document repository (which is password protected) may be used by SEA authors and PCG and PEC members, but may not be passed on to third parties since it is subject to copyright restrictions.

Participants in all capacities may reveal that they are part of the assessment and may make comments of a general nature about what it covers and how the process is unfolding, but must make it clear that they speak in their personal capacity and not on behalf of the assessment. The spokesperson role for the SEA is restricted to DEA, who may empower the assessment leaders to do so on their behalf in some instances. Media issues are handled by a communications team: the contact person from DEA is Albi Modise (AModise@environment.gov.za) and from CSIR are Biffy van Rooyen (BvRooyen@csir.co.za) and Tendani Tsedu (MTsedu@csir.co.za).

Assessment participants are reminded to treat any communication, including email and social media, as potentially in the public domain. It is strongly recommended that participants make their comments on shale gas development (fracking) thoughtfully, since if they can be construed as prejudicial, one way or another, that could undermine their credibility as independent experts. In the extreme case, this could lead to their disqualification as ongoing participants by the PEC, following an evaluation by the PCG.