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11.0 Well stimulation activities and the characterisation of stimulation fluids

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#	Department Condition		Description	Completion date	Status
	Pre-Dec 2012	Post-Dec 2012			
37	49e	53B c	Annual update of bores to be stimulated	October 2013 and annually thereafter	△
38			Submission of reports to Queensland regulatory agencies	As required	△
39	49f	53B c	Ecotoxicity Work Program Development	April 2013	●
40			Toxicity and Ecotoxicity Profiles for new chemicals. Completion of total toxicity and ecotoxicity testing. Ecotoxicity testing to be carried out in accordance with the 2000 NWQMS Australian and New Zealand Guidelines for Fresh and Marine Water Quality.	December 2013	○
41			Collection of representative samples of flow back water immediately post-stimulation and analysis	Ongoing	△
60		53B c	Preparation of Stimulation Fluids Risk Assessment incorporating results of Hazard Characterisation (DTA)	February 2014	● (red)

● Commitments completed
○ Commitments work in progress
△ Evergreen Commitments
● (red) Firm deliverables for that month

Condition 53B(b) replaces Condition 49F of the Stage 2 WMMP

11.1 INTRODUCTION

Application of hydraulic well stimulation techniques can increase CSG production from low-yielding and otherwise uneconomic wells. The objective is to enhance coal seam openings to increase the pathways for gas to flow. For the QCLNG project, stimulation activities are undertaken in the Walloon Coal Measures, normally at depths of greater than 400 m. Pre-stimulation risk assessments identify any potential impacts on the water environment and pre and post-stimulation monitoring is focused on any impact that may be occurring. The potential impact of stimulation fluids on freshwater biota is addressed through direct ecotoxicity testing.

QGC provided a detailed outline of its approach to management and monitoring of hydraulic well stimulation in the Stage 2 CSG WMMP. Information was provided on:

- Details of well stimulation activities in 2011 and 2012 and estimates of the number of well stimulations in 2013 and 2014. An update is provided in Section 11.3;
- Details of stimulation fluid constituents and stimulation fluid chemical selection;
- Toxicological and ecotoxicological information for stimulation chemicals;
- Stimulation water management;
- Stimulation fluid chemistry and water monitoring data;
- Pre-stimulation and post-stimulation water quality data and assessment; and
- A qualitative groundwater and surface water quality risk assessment.

For completeness Chapter 13.0 Well Stimulation from the Stage 2 CSG WMMP has been included as an appendix (Appendix M) to this Plan.

For the Stage 3 WMMP, QGC has:

- Provided an update of planned stimulation activities for 2013/2014; and
- Outlined a program of ecotoxicity hazard assessment and associated risk assessment.

11.2 BACKGROUND SUMMARY

Well stimulation techniques can increase CSG production from low yielding or otherwise uneconomic wells. The objective of hydraulic well stimulation is to enhance openings in the coal and increase the pathways for gas to flow. For the QCLNG project, stimulation activities are undertaken in the Walloon Coal Measures (WCM) and normally occur at depths greater than 400 m. QGC's stimulation monitoring and management process includes the use of a range of diagnostic tools to measure hydraulic fracture stimulation performance, such as:

- Production logging tools;
- Temperature surveys;
- Production testing and sampling;
- Tracers to measure extent of the fracture;
- Microseismic wells which register ground vibration; and
- Tiltmeter arrays to measure ground movement.

Typically fracturing of coal seams in the WCM has an estimated fracture height range of between 0 and 40 m and an estimated average lateral extent of approximately 100 m. Due to the depth of stimulation activities in the WCM, limited coal thickness and extent, estimated height and extent of fractures and the stimulation fluid water quality, there is considered to be little risk of contamination of other geological formations and negligible risk of contamination of surface waters. For a hydraulic fracturing event, water quality is assessed in the well and flowback waters. Monitoring of active landholders' groundwater bores (subject to access being permitted by the landholder) may be monitored under certain Queensland government EA conditions. These are for the cases where:

- Active landholders' groundwater bores are located within a 2 km horizontal radius from the location of the stimulation initiation point;
- Active landholders' groundwater bores are within 200 m vertically of the stimulation initiation point; and
- Any other bore that could potentially be adversely impacted by the stimulation activity in accordance with the findings of the risk assessment.

This monitoring occurs at a frequency of monthly for the first six months and then annually for another five years in accordance with DEHP EA conditions. Note no situation has arisen to date where private landholder bore monitoring has been necessary.

11.3 QGC STIMULATION PROGRAM

QGC reports details of its well stimulation program, covering completed activities and wells listed for possible stimulation in the year ahead. QGC's current and short term stimulation program for the Surat Basin is focused on trialing, developing and optimising stimulation techniques prior to full scale stimulation activities commencing. This is not expected to occur until 2018. Consequently, in calendar year 2012, four well stimulations were completed (refer Table 11-1). A total of eight well stimulations have been completed for the 2013 program as shown in Table 11-1. Locations are shown at Figure 11-1.

The indicative stimulation program for 2014 could consist of up to 33 wells with 13 wells in the Northern Development Area and 20 wells in the Southern Gas Fields (refer Table 11-2). At this stage no well stimulations beyond those identified in Table 11-1 are confirmed. Stimulation requirements for the QCLNG project beyond 2014 will be developed over the next two years. It is expected that in the order of 1,900 wells may be stimulated over the life of the QCLNG project.

Block	Well #	Tenure	Stimulation completion date	Easting (E_MGA94)	Northing (N_MGA94)
Celeste	10	ATP 648	20/11/2011	270893.18	6990093.82
Celeste	11	ATP 648	22/11/2011	270893.18	6988593.26
Myrtle	9	ATP 621	20/04/2012	270893.18	6966408.58
Myrtle	10	ATP 621	30/04/2012	268659.05	6967122.6
Cameron	8	ATP 852	24/05/2012	769685.1	7109076.46
Cameron	10	ATP 852	07/06/2012	769482.54	7108052.6
Kathleen	6	ATP 651	16/04/2013	766550.452	7097888.617
Kathleen	3	ATP 651	21/04/2013	766686.401	7098716.439
Kathleen	2	ATP 651	27/04/2013	765622.056	7099344.191
Kathleen	5	ATP 651	01/05/2013	765315.547	7098418.084
Clunie	7	ATP 648	02/06/2013	288871.896	6977144.231
Clunie	8	ATP 648	10/06/2013	288208.099	6976713.773
Clunie	9	ATP 648	17/06/2013	289544.684	6976881.162
Clunie	10	ATP 648	26/06/2013	288499.545	6977848.576

Table 11-1 – Well stimulations, 2011 to 2013

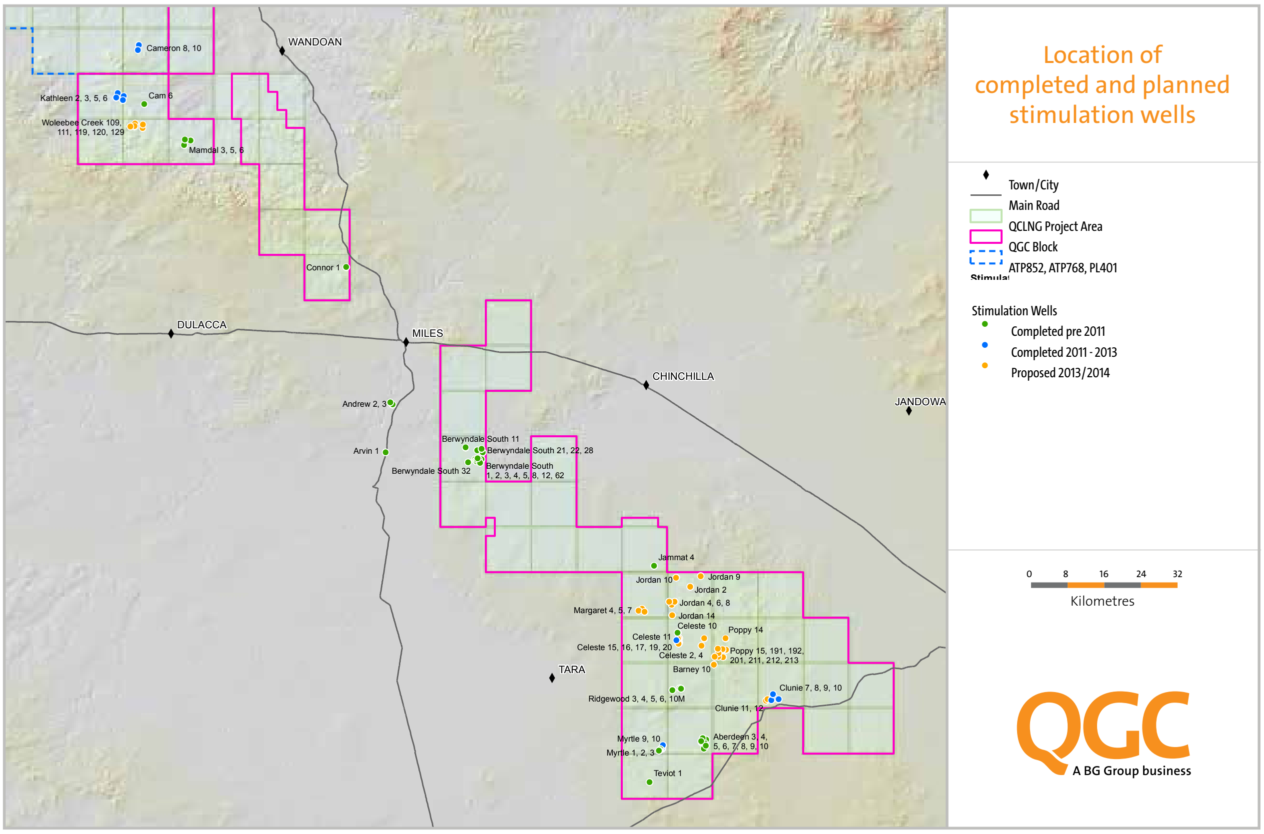

Figure 11-1 – Location of completed and planned stimulation wells

Block	Well #	Stipulation completion date	Easting (E_MGA94)	Northing (N_MGA94)
Woleebee Creek	109	Q1 2014	768,673.997	7,093,098.727
Woleebee Creek	111	Q1 2014	770,076.386	7,092,888.338
Woleebee Creek	119	Q1 2014	767,779.375	7,092,500.000
Woleebee Creek	120	Q1 2014	768,574.000	7,092,558.000
Woleebee Creek	129	Q1 2014	770,044.376	7,092,169.782
Celeste	15	Q1 2014	271,099.913	6,987,893.514
Celeste	16	Q1 2014	271,206.215	6,988,132.737
Celeste	17	Q1 2014	270,967.640	6,988,074.185
Celeste	19	Q1 2014	270,977.130	6,988,880.611
Celeste	20	Q1 2014	271,195.435	6,989,017.663
Poppy	15	2014	278,289.888	6,986,942.918
Poppy	191*	2014	279,157.659	6,986,866.915
Poppy	192*	2014	279,777.100	6,986,790.000
Poppy	201*	2014	278,445.815	6,986,109.190
Poppy	211	2014	277,716.558	6,985,393.856
Poppy	212*	2014	278,418.670	6,985,407.464
Poppy	213*	2014	279,251.300	6,985,284.000
Poppy	14	2014	279,656.867	6,989,081.130
Barney	10	2014	277,639.205	6,983,753.018
Jordan	2	2014	273,044.532	6,999,524.895
Jordan	4	2014	269,690.721	6,995,826.382
Jordan	6	2014	270,225.021	6,996,403.383
Jordan	8	2014	269,227.516	6,996,386.032
Jordan	10	2014	270,393.891	7,001,344.843
Clunie	11	2014	287,236.884	6,976,596.987
Clunie	12	2014	287,497.754	6,976,839.125
Celeste	2	2014	275,759.437	6,989,049.438
Celeste	4	2014	275,287.289	6,987,565.043
Jordan	4	2014	269,839.620	6,993,643.559
Jordan	14	2014	274,896.270	7,001,711.494
Margaret	4	2014	264,321.489	6,994,827.120
Margaret	5	2014	263,682.796	6,994,498.360
Margaret	7	2014	264,777.789	6,994,249.797

** Well locations and numbers are subject to change pending development optimisation activities*

Table 11-2 – Planned well stimulations 2014

QGC will provide the Australian Government with an annual review of QCLNG well stimulation activities and estimated activities for the year ahead. The annual review will include:

- Details of wells stimulated in previous year and proposed for current year;
- Location plans;
- Update of indicative estimates of stimulations for future years;
- Tabulated summary of completed stimulation risk assessments, and submitted Queensland statutory reports
- Toxicological and ecotoxicological profiles of any new chemicals proposed to be used; and
- Exception reporting.

The annual review will form part of QGC's annual reporting obligations to the Department, which includes publishing of annual reports on QGC's website at the same time it is provided to the Department in October each year.

11.4 STIMULATION FLUID CONSTITUENTS

QGC uses its own produced CSG water , where available, to perform hydraulic stimulations. Well stimulation fluid is 95% water and sand, supplemented with chemicals found in many household products. It may contain gels, nitrified foam and carbon dioxide. Various proppant types are used including sand, resin-coated sand and man-made ceramics depending on the permeability or grain strength needed. For each well stimulation, QGC teams make a selection from the chemicals (including biocides, corrosion inhibitors and other chemicals) listed in Table 11-3. These chemicals are listed on the QGC website at:

http://www.qgc.com.au/environment/environmental-operations/chemicals-used-in-hydraulic-fracturing.aspx

Typically, these chemicals are supplied under a variety of different product names from various suppliers. The scous (e.g. a gel) and which consequentially allows more sand grain per litre of water to be carried into the frac voids. 'Breaker' chemicals are required to break the gel connection created in guar gum polymers to assist in returning frac fluid to the surface.

For ideal performance, fracturing fluids possess the following five qualities:

- Be sufficiently viscous (thick) to create a fracture of adequate width;
- Maximise fluid travel distance to extend fracture length;
- Be able to transport required amounts of proppant (e.g. sand) into the fracture;
- Require minimal gelling agent to allow for easier degradation or 'breaking'; and
- Not lead to contamination of aquifers used or potentially used by others.

Queensland government EA requirements preclude the use of polycyclic aromatic hydrocarbons or products that contain polycyclic aromatic hydrocarbons in stimulation fluids at concentrations above the reporting limit. QGC also prohibits the use of a range of organic chemicals by stimulation contractors such as monoaromatic petroleum hydrocarbons (e.g. benzene), diesel, phenols, ethylene glycol, aromatic solvents and formaldehyde.

The well stimulation fluids (see Table 11-3) for QGC's 2013 program are representative of the range of fluids that have been used in general to date and are representative of those that are likely to be used in coming years. It should be recognised however that the current programs undertaken by QGC are aimed at assessing fracture fluid effectiveness and consequently fluid mixture chemistry may change in future to improve particular fluid functionalities (e.g. fracturing foams and x-linkers). Significant changes will be noted in the annual report.

Service Company Name or Handling Name and function	Chemical operation	Common uses	CAS number
Biocide			
BE-09	Tributyl tetradecyl phosphonium chloride	Biocide used industrial cleaning, oil field waters, papermaking	81741-28-8
BE-6	Bronopol	Eliminates bacteria in water	52-51-7
Magnacide 575	Tetrakis (hydroxymethyl) phosphonium sulfate	Eliminates bacteria in water for farming uses	55566-30-8
M275, BPA68915	Magnesium Nitrate	Eliminates bacteria in water	10377-60-3
Sodium Hypochlorite, BE-7	Sodium hypochlorite	Household bleach, disinfectants	7681-52-9
K-38	Disodium octaborate tetrahydrate	Fertiliser	12008-41-2
Clay control			
L064, ClayTreat-3C	Tetramethylammonium chloride	Salt used for protein purification	75-57-0
KCl	Potassium chloride	Fertilisers	7447-40-7
ClayCare, ClayTreat-2C, Choline chloride	Choline chloride	Agricultural feed additive	67-48-1
ClayCare, ClayTreat–2C, Choline chloride	Choline chloride	Agricultural feed additive	67-48-1
Corrosion inhibitor			
Gelatine	Gelatine	Marshmallows, canned hams, desserts and dairy products, pharmaceuticals	9000-70-8
Crosslinker			
XLW-10A	Sodium Tetraborate	Detergents, soaps	1303-964
L010, Boric Acid	Boric acid	Antiseptic for abrasions, flame retardant	10043-35-3, 001333-73-9
K-38	Disodium octaborate tetrahydrate	Flame Retardant, Wood treatment	12008-41-2
CL-28M	Borate Salt	Agricultural Plant Food/Fertilizer, Industrial Glass Manufacturing Additive	14808-60-7 (link N/A)
Gel			
J580, GW-3, GW-4, GW-38, WG-36, WG-11	Guar gum, Polysaccharide, Carbohydrate polymer	Food thickening agent	9000-30-0, 68130-15-4
GLFC-5	Guar slurry	Thickening agent	9000-30-0
WG-21, WG-17	Cellulose derivative	Thickening agents, creams, ointments	9004-62-0

Service Company Name or Handling Name and function	Chemical operation	Common uses	CAS number
Function: Gel breaker			
GBW-30	Hemicellulase enzyme carbohydrates	Food additives, coffee processing	9012-54-8
GBW-12CD	Hemicellulase enzyme carbohydrates	Food additives, coffee processing	9025-56-3
Optiflow HTE	Silica (with crushed walnut shells)	Cosmetics, exfoliants	14808-60-7
GBW-18	Sodium persulfate	Hair bleaching, detergents	7775-27-1
Vicon NF	Chlorous acid, sodium salt	Food Additive	7758-19-2
J218, J479, GBW-5	Diammonium peroxidisulphate	Hair bleach, household cleaners, etching copper, printed circuit boards	7727-54-0
Gel stabiliser Gel-Sta L	Sodium thisosulfate	Preservative, Stain Remover, Bleach and Chlorine Remover	7772-98-7
Friction Reducer FR-46	Ammonium sulfate	Fertilisers	7783-20-2
Other			
Nitrogen	Nitrogen	Refrigeration, supercooling, inert gas	7727-37-9
Carbon Dioxide	Carbon dioxide	Dry Ice	124-38-9
Sodium Chloride, Rock Salt	Sodium chloride	Table salt	7647-14-5
Oxygen Scavenger			
Oxygon	Organic acid salt	Removal of dissolved oxygen in fluids, meat processing	6381-77-7
GS-1L	Sodium thiosulfate	Leather tanning, fish farming, photography, medicines	7772-98-7
pH buffer			
M003, Soda Ash	Sodium carbonate	Neutralise acids, water softening	497-19-8
Sodium Hydroxide	Sodium hydroxide	Manufacturing of paper, textiles, drinking water, soaps, detergents, drain cleaner	1310-73-2
BF-3	Sodium Bicarbonate	Baking soda	144-55-8
BF-7L	Potassium carbonate	Additive in soaps, wines, dyes, glass	584-08-7
J494	Carbonic Acid,sodium salt (2:3)	Detergents, soaps	533-96-0
Acetic Acid, BF10L, L401	Acetic acid	Vinegar	64-19-7
HCl	Hydrochloric acid	Swimming pool pH control	7647-01-0
Surfacant			
GasPerm 1100	Ethanol, Terpene and Terpenoid, Sweet orange-oil	Bathroom Cleaner, Dishwashing Detergent, Dish Soap, Multi-surface Cleaner, Beer	64-17-5, 68647-72-3
Superflo 2000	Terpene	Used as a food additive in Beer	68647-72-3

Table 11-3 – Hydraulic fracturing fluid constituents

11.5 STIMULATION FLUID RISK ASSESSMENT AND ECOTOXICITY HAZARD ASSESSMENT

CSG water from the Surat Basin is used for stock and domestic water supply purposes. In a 2012 study by DNRM it was established that representative test freshwater organisms are sensitive to untreated CSG water due primarily to its high salinity. Consequently the aim of the stimulation fluid ecotoxicity hazard assessment is to characterise the incremental hazard of stimulation chemicals and flowback waters to aquatic biota as compared to CSG waters.

The risks to MNES associated with stimulation fluids are considered as part of a wider risk assessment framework. This framework uses the standard industry recognized process which defines Risk as Impact x Probability. The elements of the process are illustrated in Figure 11-2. As part of the Hazard Characterisation process, QGC has initiated a program of ecotoxicity testing to satisfy Condition 53B b (formerly 49f) of referral EPBC 2008/4398 approval. The Condition states that QGC must include as part of their Coal Seam Gas Water Monitoring and Management Plan (WMMP):

"...details of constituent components of any hydraulic fracturing agents and any other reinjected fluid(s), and their toxicity as individual substances and as total effluent toxicity and ecotoxicity, based on methods outlined in the National Water Quality Management Strategy..."

The Ecotoxicity Work Program was submitted to The Department for its endorsement on 31 May 2013, in line with QGC's Stage 2 WMMP Commitment 39. It was reviewed by ERISS and a discussion was held with all parties on 13th June 2013 when remaining issues were discussed and incorporated in the updated work program.

This work program is part of a collaborative effort with the other CSG Proponents (APLNG and GLNG) to jointly undertake this ecotoxicity work program, where QGC has been nominated as the program operator. An outline of the program is presented in Figure 11-3.

The objective of this project is to define and implement a program that will investigate the ecotoxicity of well stimulation fluids to surface water organisms taking into account the natural background ecotoxicity of CSG water to surface water ecosystems to quantify potential impacts.

It must be recognised that the focus of the program is to make a quantitative assessment of the potential incremental hazard of stimulation chemicals on ecosystems including MNES if such chemicals were released to the environment via controlled or uncontrolled means. Given that there is a negligible to low risk of migration of stimulation chemicals to the external environment (under either controlled or uncontrolled conditions), it is important that the reporting of the ecotoxicity program will be undertaken within a risk-based context.

The other key element of the risk assessment is the Probability of an event occurring which depends on the pathway and likelihood components. As demonstrated in Santos' extensive probability assessment both pathway occurrences and likelihood are low. Therefore, there is little risk of stimulation fluids entering receiving waters of the Murray-Darling Basin or Dawson River Catchments. The key findings of the risk assessment process are indicated in Figure 11-4.

These aspects will be included and documented in the final stimulation risk assessment.

Please note that in the work program the use of the term 'total effluent' which has been used in Condition 53B(b) has been replaced by the word 'mixture' or similar.

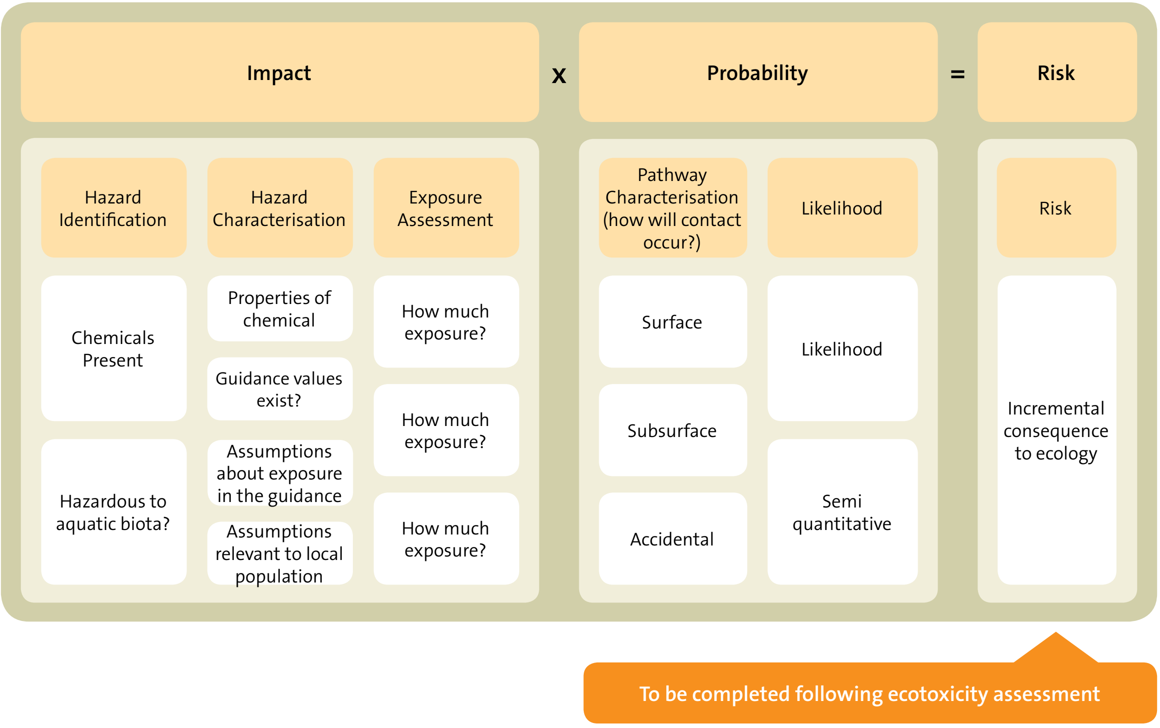

Figure 11-2 – Direct toxicity assessment in a risk assessment framework

11.6 ECOTOXICITY HAZARD ASSESSMENT WORK PROGRAMS

In line with its commitments, QGC has implemented the following:

- Assessment of the toxicity of individual chemicals of concern;
- Provision of toxicity and ecotoxicity data, where available, for chemicals in the Stage 1 and Stage 2 WMMPs; and
- Preparation of a workplan for direct toxicity testing of stimulations fluids (see Section 11.6).

The work plan is presented in Appendix M.

The direct toxicity testing work plan has been substantially agreed with ERISS and is underway. That program will be complete by December 2013. The results will be incorporated into an assessment of the risk to MNES posed by stimulation fluids, it will incorporate:

- The toxicity of individual chemicals of concern;
- The potential pathways and likelihood of release and migration; and
- Potential receptors.

The DTA program, which consists of a number of tasks is outlined below:

Task 1 – Hydraulic fluid constituents review

A review of the ecotoxicity of constituents of hydraulic stimulation fluids used by QGC and its contractors. The review will be extended to look at stimulation fluids and constituents used by the two other CSG proponents. For constituents which are either (i) not well described in terms of ecotoxicology or (ii) are widely used in circumstances that could lead to environmental releases, a more detailed literature review of their ecotoxicology will be carried out.

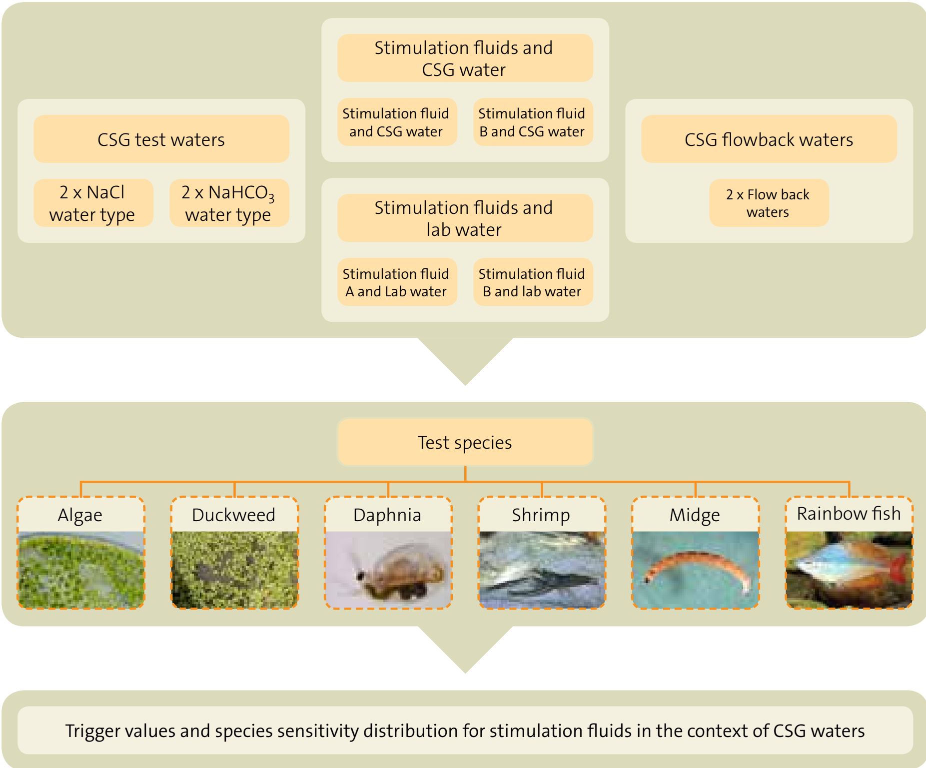

Figure 11-3 – Outline of ecotoxicity testing program

Task 2 – Representative area and baselining

Direct toxicity assessment of representative CSG water samples will be undertaken to assess the ecotoxicity of in situ groundwater in the Walloon Coal Measures. The testing will be undertaken on fresh water organisms. Other proponents will select samples for testing based on a 'representativeness' criterion for their tenements.

Task 3 – Assessment of incremental toxicity from hydraulic stimulation fluid mixtures

Representative samples will be tested comprising various volumetric mixes of hydraulic stimulation fluid and:

- Typical CSG water used for stimulation activities and sampled at selected representative well-heads; and
- Laboratory water to determine the incremental (eco)toxicity over the baseline for freshwater organisms.

An independent review of the fluids used in the testing, has been carried out by a stimulation expert (Appendix M) who concluded that:

"Based on historic information provided by QGC and the author's knowledge of the local industry, the fracturing fluid formulations designed, mixed and tested for this QGC initiated ecotoxicity testing project are a fair representation of hydraulic fracturing fluids that have been pumped in the past in Queensland CSG and are very likely to be continued to be employed in future CSG wells in Australia".

Typical frac pond water (which is a mixture of variously sourced CSG waters subject to rainfall dilution and evaporative concentration) will also be tested. Hydraulic stimulation fluids will be tested as a mixture unless a constituent is deployed for which the whole fluid testing has an identified significant incremental toxicity, for which the individual source needs to be identified. Figure 11-3 illustrates the format of the tests. Representative samples of CSG waters, hydraulic stimulation fluid and CSG water mixtures from QGC's northern, central and southern blocks will be tested. QGC will report the findings of its study in Q4 2013 in line with its Commitment 40.

Task 4 – Assessment of a ‘worst case’

An assessment of the potential worst case for CSG and/or hydraulic stimulation fluid (alone or in combination) toxicity will be carried out. This will assist in developing preventative measures during the hydraulic stimulation activities, if required. For the QCLNG project, several MNES have been identified as being relevant to the assessment of Condition 53B(b). In particular potential impacts on MNES listed species, the Fitzroy River Turtle and Murray Cod were considered relevant with a focus on the protection of aquatic ecosystems.

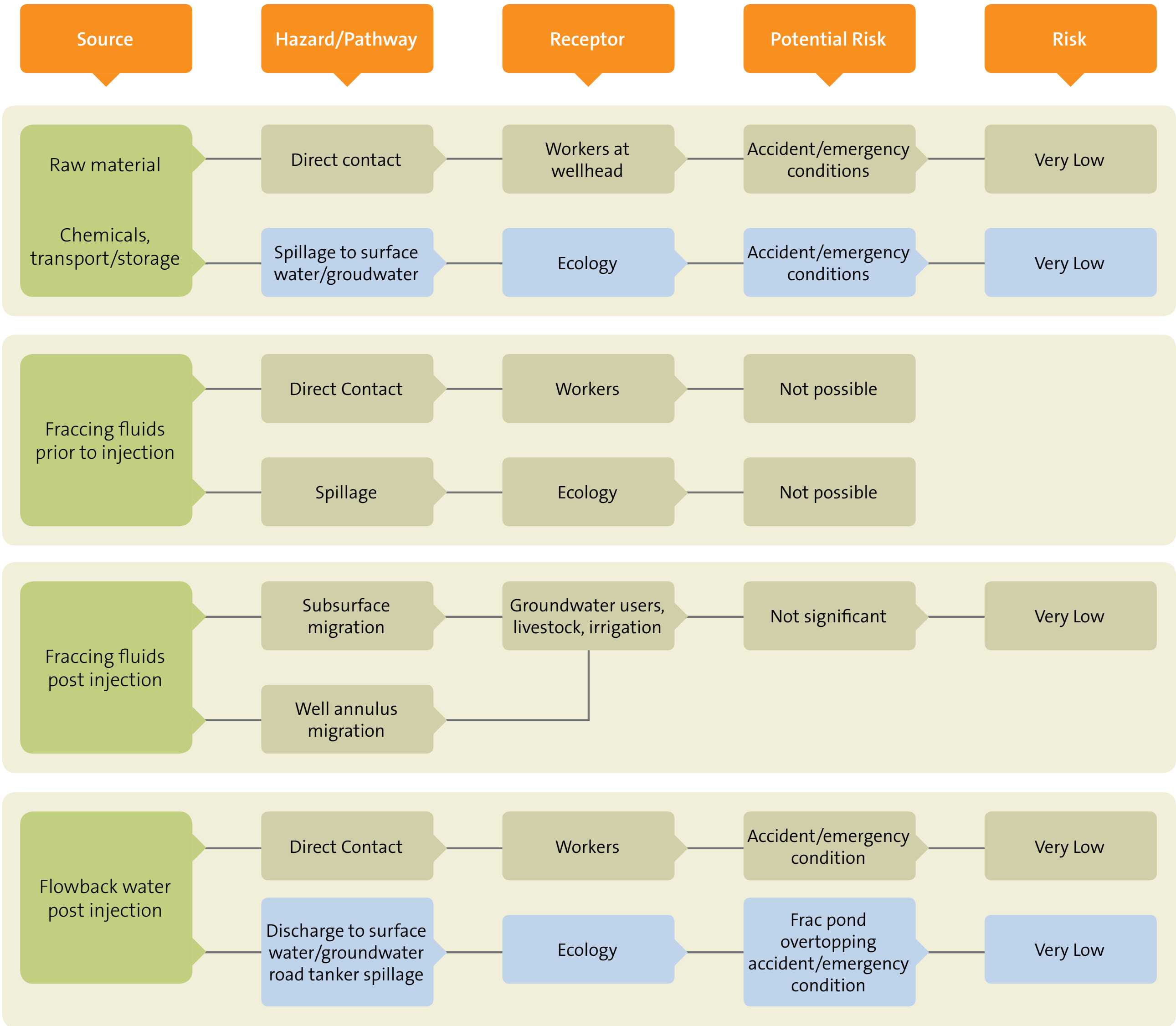

Figure 11-4 – Stimulation fluids pathway assessment

Several key knowledge requirements were raised in the ERISS Review of the QGC Stage 2 WMMP, which are considered in this ecotoxicity program (ERISS: Comments on Condition 49f of QGC’s Stage 2 CSG Water Monitoring and Management Plan). These included knowledge requirements to understand the potential risk of well stimulation chemicals to MNES, in particular:

- The extent to which well stimulation chemicals contribute to any toxicity observed in the well stimulation fluids; and,
- The extent to which well stimulation chemicals increase the toxicity of CSG water.

11.7 PROGRAM STATUS

As at June 2013 the following tasks have been completed or are in progress:
- Collection of representative QGC CSG water samples; and
- Baseline ecotoxicity testing (in progress), out of 64 separate ecotoxicity tests one remains to be completed (November 2013).

The forward schedule is presented at Figure 11-5.

QGC has already implemented the following commitments:
- Assessing toxicity of individual stimulation chemicals of concern;
- Provision of toxicity and ecotoxicity data for chemicals in the Stage 1 and Stage 2 WMMPs; and
- Ecotoxicity assessments to be carried out in accordance with the 2000 NWQMS Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

The following actions are in progress:
- Having an independent review of the QGC stimulation fluids testing program undertaken prior to proceeding;
- Submission of a peer reviewed report in December 2013; and
- Commitment to ensure representative samples of flow back water are collected immediately after stimulation activities and the date and time of testing is recorded.

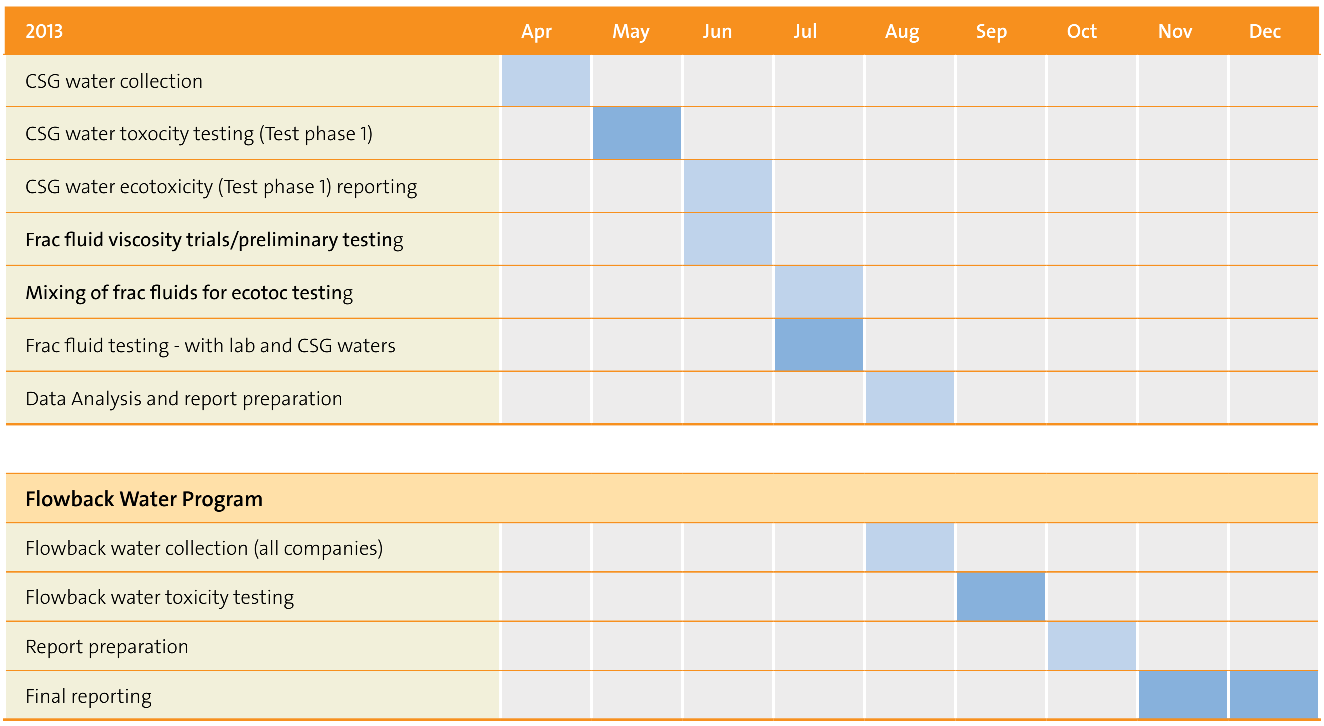

Figure 11-5 – QGC ecotoxicity program schedule

#	Department Condition		Description	Completion date	Status
	Pre-Dec 2012	Post-Dec 2012			
37	49e	53B c	Annual update of bores to be stimulated	October 2013 and annually thereafter	△
38	49e	53B c	Submission of reports to Queensland regulatory agencies	As required	△
39	49f	53B c	Ecotoxicity Work Program Development	April 2013	●
40	49f	53B c	Toxicity and Ecotoxicity Profiles for new chemicals. Completion of total toxicity and ecotoxicity testing. Ecotoxicity testing to be carried out in accordance with the 2000 NWQMS Australian and New Zealand Guidelines for Fresh and Marine Water Quality.	December 2013	○
41	49f	53B c	Collection of representative samples of flow back water immediately post-stimulation and analysis	Ongoing	△
60		53B c	Preparation of Stimulation Fluids Risk Assessment incorporating results of Hazard Characterisation (DTA)	February 2014	● (red)

● Commitments completed
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△ Evergreen Commitments
● (red) Firm deliverables for that month