

# Green Deal – Testing & Assurance Strategy

24 July 2012

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# 1. Introduction

## 1.1 Document Purpose

The purpose of this document is to define the high level strategy for testing and assurance for the Green Deal framework.

The target audience for this document is as follows:

- DECC Green Deal Programme team
- Pioneer Green Deal Providers and Suppliers
- Master Registration Agreement Services Company (MRASCo)
- ElectraLink
- Landmark
- EST Scotland
- Distribution Network Operators (DNO)

The document is structured into the following sections:

- Introduction – explains the purpose, objectives, scope and content
- Context – provides background to the Green Deal programme
- Testing Strategy Principles – explanation of the key principles which underpin the testing strategy
- Approach – explains the approach and the testing stages
- Participants and Organisation Responsibilities – identifies the participants who will be involved in the testing activities and the associates responsibilities
- Schedule – provides an overview of the key deliverables and timetable
- Assumptions and constraints
- Test reporting requirements
- Glossary - definition of terms used in the document

## 1.2 Objectives

The successful operation of the Green Deal framework will involve a large number of individual participants working to a pre-agreed set of common market processes underpinned by legislative and regulatory frameworks and a number of standard IT systems. Given the complexity of the Green Deal ecosystem, it is important that there is confidence that the framework will operate as intended before significant Green Deal activity takes place. By identifying any issues with the overall framework, supporting market processes, information flows, IT systems and guidance documentation early, resolutions and workarounds can be defined and implemented in time for full market operations.

Green Deal Market Testing (GDMT) is designed to prove that the Green Deal Framework, as set out in the target operating model (TOM, to be published in due course), operates successfully and correctly. GDMT will be executed in a controlled environment and involve a core of participants covering the majority of roles set out in the Green Deal TOM. End to end testing of the core Green Deal process from lodging an assessment through to payment and remittance will be covered during GDMT.

In addition to providing assurance that the overall Green Deal framework works, GDMT will also be used to help define the tests that prospective Green Deal Providers will be required to undertake as part of their application process to demonstrate their ability to engage appropriately with the Green Deal infrastructure.

## 1.3 Exclusions

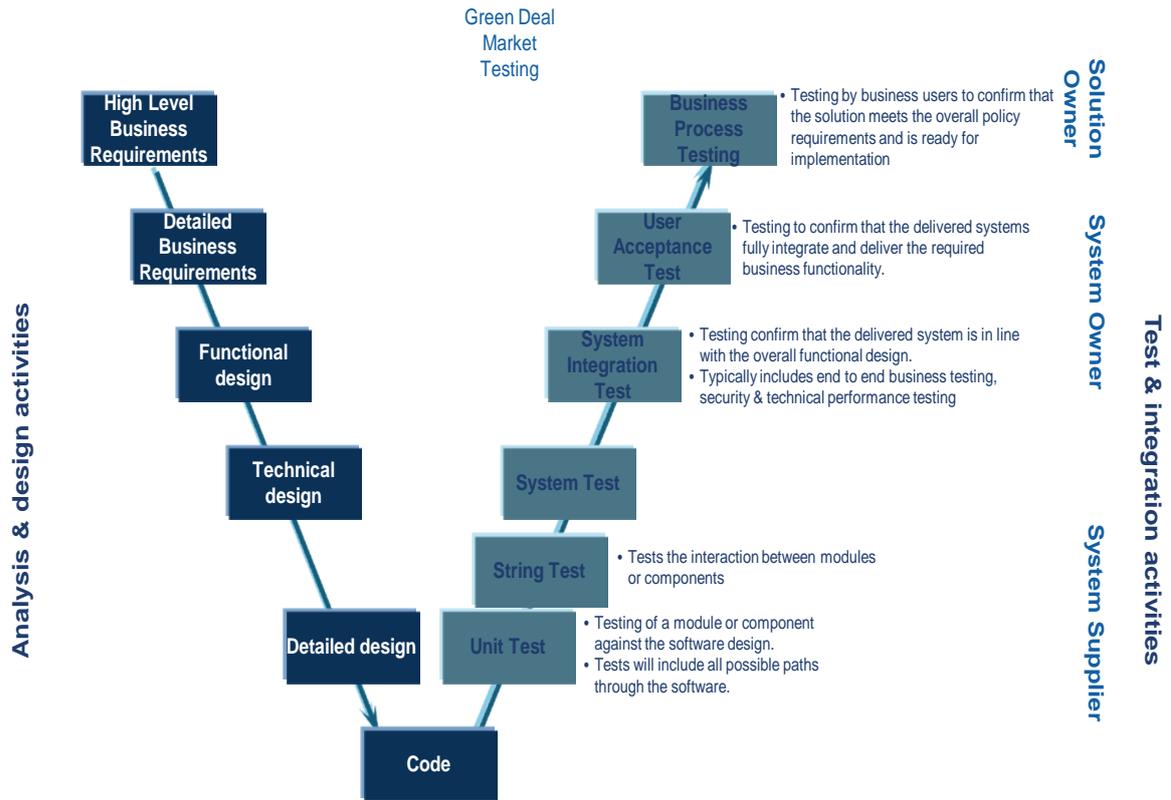
The Green Deal Market Testing does not set out the process that Providers and other participants will be required to follow in order to demonstrate their readiness to operate within the Green Deal framework.

## 1.4 Scope of this document

The scope of GDMT is determined by the scope of the Green Deal Target Operating Model, Green Deal Arrangements Agreement and Green Deal Code of Practice. The diagram below illustrates the overall business architecture for the Green Deal framework.

### 1.4.1 Testing Stages

Testing of the Green Deal Framework and all its sub-components is achieved through a structured series of test stages. The diagram below illustrates the overall testing lifecycle and the position of GDMT within it.



Each stage of testing highlighted in the diagram above is described in the table below:

Stage	Description	Responsibility	In Scope?
Unit & String Testing	Unit testing is performed to ensure that a single unit (e.g. program module) is syntactically correct, and behaves according to all defined requirements. String testing is performed to verify that the sub-function being developed operates correctly, in accordance with the Detailed Design specifications. The sub-function is tested in isolation to confirm it is correct and fundamentally free of defects.	System Developer	No
System Testing	System Testing verifies that each application works according to specification. The test is focused on the changes to the application itself, as well as the internal functions of the application. It does not cover interactions with other applications within the project. New data and converted data is to be used during testing	System Developer	No
Systems Integration Testing (SIT)	Systems Integration Testing (SIT) determines the ability of multiple independent systems to integrate and communicate in a cohesive, synchronised manner. The testing is focused	System Developer	No

Stage	Description	Responsibility	In Scope?
	on the interfaces.		
User Acceptance Testing (UAT)	A testing type during which application-specific tests are performed in order to ascertain whether the software solution is ready for production implementation.	System Owner	No
Business Process Testing (BPT)	It is an 'end to end' process where testing provides assurance that the Green Deal framework will work as intended in a "Production like" environment. BPT tests a business process across a number of software applications.	Green Deal Programme	Yes

## 2. Context

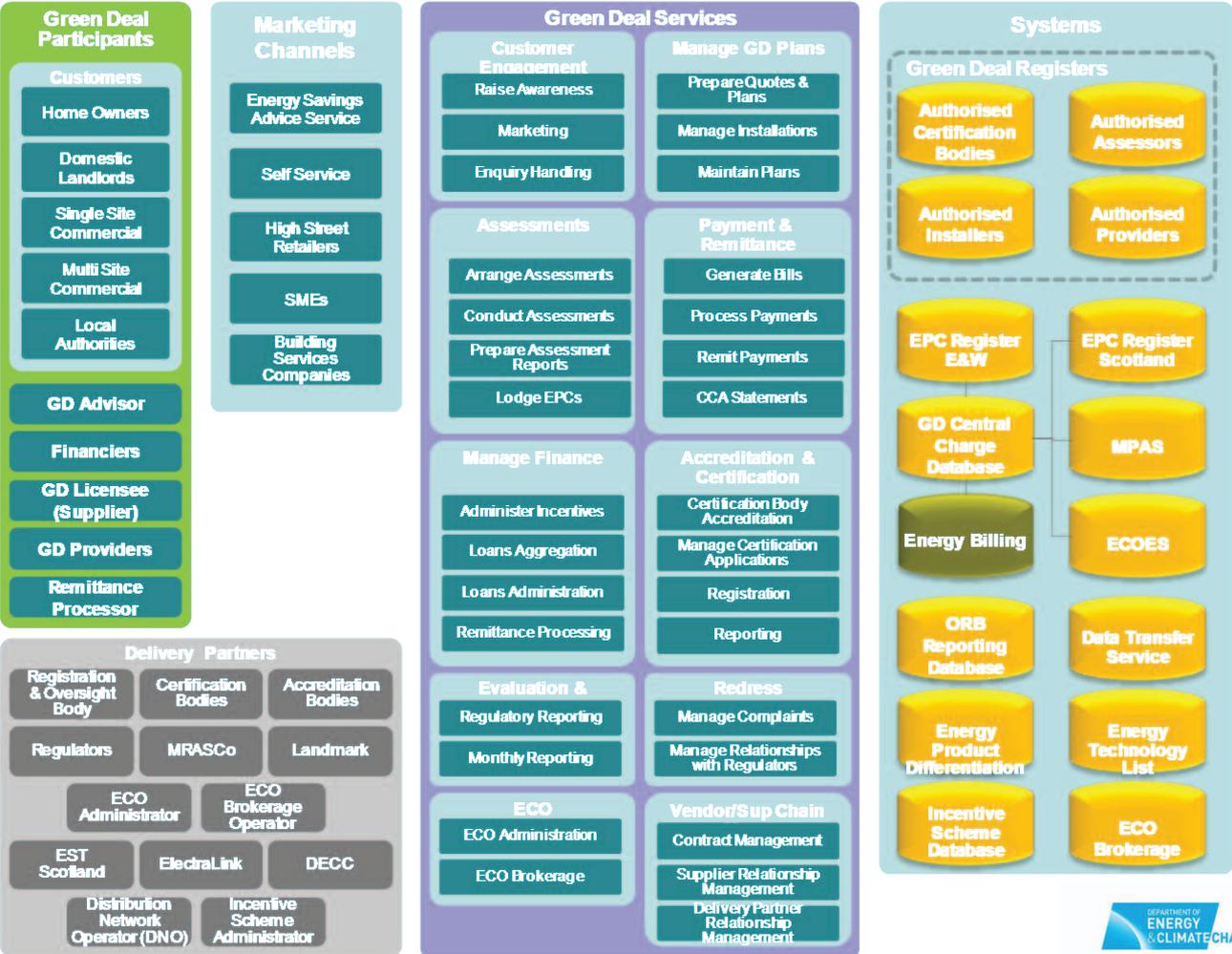
### 2.1 Green Deal Overview

The Green Deal is a new, innovative market led framework which will enable consumers to have measures which deliver improvements in the energy efficiency of their homes installed at no upfront cost and then repay the costs over the lifetime of the measure via an additional charge on their electricity bill. Key is the “golden rule”– the savings associated with the Green Deal measures must be greater than the cost of the installation. The consumer will only pay for the Green Deal measures while they are responsible for the electricity bill on a property. Responsibility for paying the Green Deal charges will transfer to the new owner when a property is sold or to a new tenant when there is a change of tenancy in a rented property.

Success of the framework is dependent on a broad group of stakeholders and commercial organisations. DECC’s primary responsibility in delivering the Green Deal is establishing the legislative framework in which the Green Deal will operate and procuring a number of supporting functions. The service to customers will be delivered by Green Deal Participants (Green Deal Advisors, Green Deal Providers, installers, financiers and energy companies). Developing and delivering Green Deals depends on participants coordinating their activities.

### 2.2 High Level Architecture

Detailed below is the high level architecture diagram for the Green Deal illustrating the participants in the Green Deal framework along with the delivery partners who support it’s delivery along with the services that make up the Green Deal framework and the supporting IT systems.



## 3. Testing Strategy Principles

This section sets out the high level strategic principles upon which this Testing Strategy is based. It also defines the high level success criteria for each test stage.

### 3.0.1 High Level Principles

The high level strategic principles that underpin Green Deal Market Testing (GDMT) are set out below:

- The testing strategy will take into account the constraints of the Green Deal programme timescales
- The baseline for GDMT is:
  - Green Deal TOM
  - Green Deal Arrangements Agreements
  - Green Deal Code of Conduct
  - Revised Statutory Licence Conditions (SLC) for energy suppliers
- The GDMT baseline will be managed through programme change control
- GDMT will only commence execution once individual systems components have been proven.
- GDMT is not a market entry process.
- A representative sub-set of participants covering the roles set out on the GDMT baseline and selected from the Green Deal Pioneer Group will take part in GDMT
- Where ever practical, GDMT will built on materials from previous stages of testing e.g. test scripts / scenarios / data from GDCC UAT/data from EPC register testing to reduce repetition, preparation time and effort.

### 3.0.2 Test Stage Success Criteria

Each of the GDMT test stages will be deemed to completed successfully if the Green Deal processes have been proven such that:

- There are no outstanding high severity problem reports
- There are no outstanding medium severity reports for which the workaround is unworkable in production

- The medium severity problem reports outstanding do not give rise to problems which if taken together are equivalent to one high level severity problem
- There is an agreed remedial plan to resolve all outstanding medium, low and cosmetic severity problem reports and to re-test to verify that they have been cleared
- Work arounds agreed as a result of issues uncovered in Phase 1 testing will be incorporated into Phase 2 testing to provide assurance that they are workable in a near-production environment.
- The proposed definition of severity categories are as follows:
- “High severity problems” cause: the total system to fail; or a business function to fail; or incorrect financial information to be produced and for which there is no acceptable workaround;
- “Medium severity problems” prevent correct operation of a function and where the workaround is too cumbersome to be used in live operation. Medium severity problems include the occurrence of missing fields or incorrect calculations;
- “Low severity problems” are ones that have a relatively easy workaround. For example the failure does not affect the validity of calculations or mislead a central service provider or external participant;
- “Cosmetic problems” would include spelling errors and minor problems with positioning of fields on a form or most documentation errors.

## 4. Testing Approach

The testing approach described in this section recognises that there are significant constraints on the time available to carry out testing activities and to the availability to systems and supporting processes.

### 4.1 Constraints

There are a number of constraints for this testing strategy:

- MRASCo are due to complete GDCC UAT Phase 1 by late September and GDCC UAT Phase 2 by early November
- Testing of the revised EPC registers is scheduled to complete by mid-September
- Energy Suppliers billing systems are unlikely to be available for market-level testing in advance of 1st October
- Green Deal plans can be set up from January 2013
- The earliest date at which Green Deal Providers can request verification of proposed Green Deal plans is 14/01/2013
- The earliest date at which Green Deal Plans can be signed and issued to consumers is 28/01/2012
- The earliest start date for Green Deal Daily Charges is 01/03/2013

Given these constraints, a three-stage process to business testing is proposed.

- Phase 0 - will focus on establishing a common level of understanding across the Pioneer Group who, by signing the Pioneer Group MOU, have indicated their intention to enter the Green Deal market early and committed to supporting testing activity.
- Phase 1 – a series of conference room tests that will focus on gaining assurances that the designed processes (assessment to payment and remittance) and information flows will work as intended.
- Phase 2 - execution of end to end market testing utilising the core systems being developed/revised to support the Green Deal processes and the evaluation and monitoring of early Green Deal activity.

### 4.2 Phase 0 - Process Understanding

The scope of this initial phase of testing related activity is the core Green Deal process from the point where a Green Deal Assessment has been undertaken and logged through to

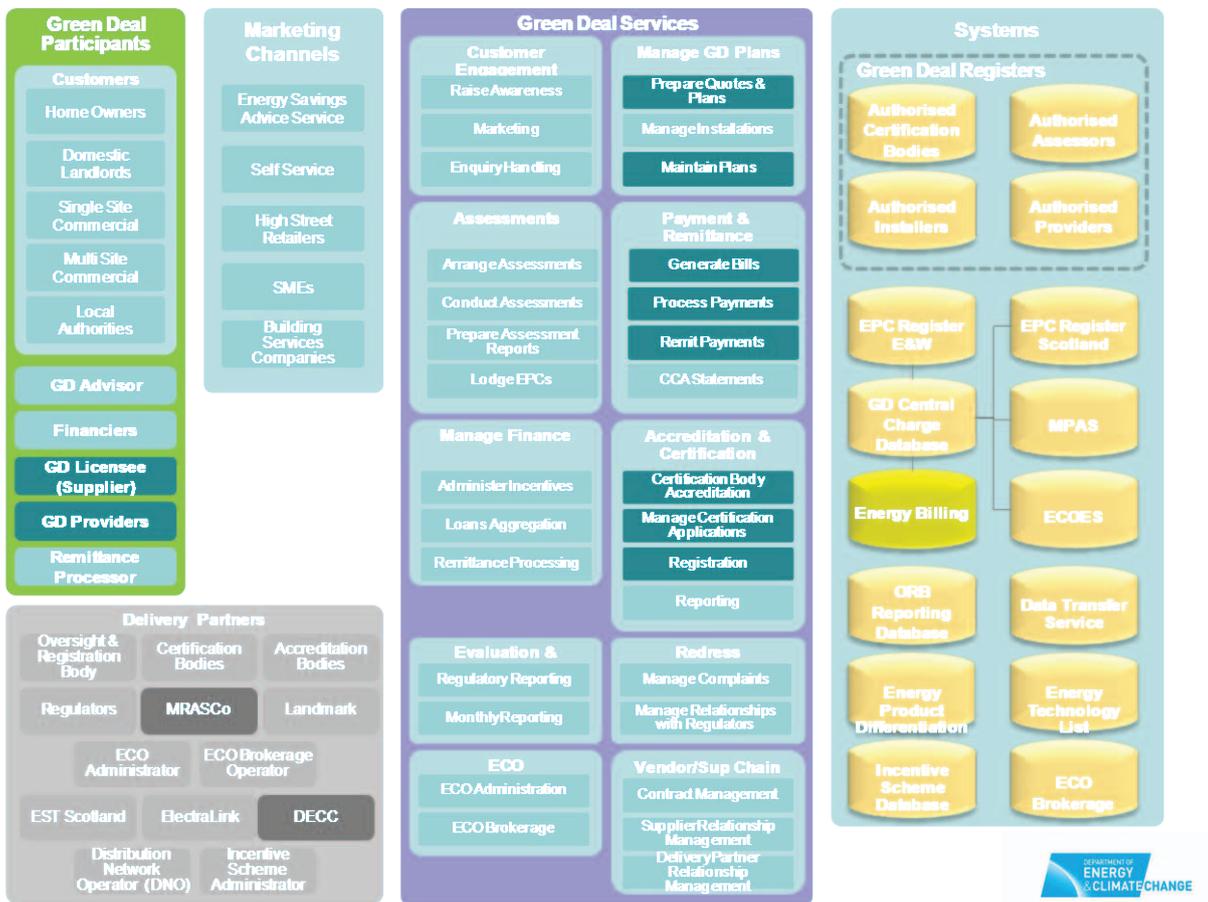
payment and remittance of Green Deal charges. Activities will focus on the interactions and associated flows of information between Green Deal Providers, Green Deal Licensees and the GDCC.

### 4.2.1 Objectives

- Establish a common level of understanding of the core Green Deal processes across Pioneer Group members in advance of any test execution activities.
- Early Identification of process issues
- Provide a forum for Green Deal pioneers to raise questions and issues associated with the Green Deal framework to help them with their individual preparations for entering the Green Deal market place.

### 4.2.2 Scope

The scope of this phase of testing are highlighted in the diagram below.



### 4.2.3 Participants

- Green Deal Pioneer Group – providers and suppliers

- MRASCo
- DECC as facilitators

#### 4.2.4 Approach

During this phase, a series of workshops will be held with the Green Deal Pioneer group. A series of high level business scenarios will be used to support process walkthroughs which will include simulating the passing of information on data flows between Providers, Suppliers and the GDCC.

Paper templates will be used by participants to record the information which needs to be included in the relevant data flows. These completed templates will then be reviewed by a participant representing the functions of the GDCC and the appropriate response flows created, simulating the flow of information.

This process will provide participants with a greater appreciation of how information will be exchanged between parties and the information that they will receive and be required to provide. At the same, the process walkthroughs will enable early identification of any mismatches between the information that will be available to a participant at a given point in the process and the information they require to undertake their activities.

### 4.3 Phase 1 - Conference Room Tests

None of the key systems required to underpin the operation of the Green Deal framework will be available for end to end testing prior to the Green Deal legislative framework becoming operational in October 2012. In order to provide a level of assurance that the end to end process will operate as intended, a series of conference room tests with simulated process flows using paper is proposed. While this phase will not demonstrate that the end to end process and supporting systems operate correctly, it will enable the identification of issues/problems resulting from:

- Mis-alignment of information flows between process flows
- Mis-alignment between guidance documents, other supporting documentation (e.g. codes of practice and framework level agreements) market process flows and system design specifications

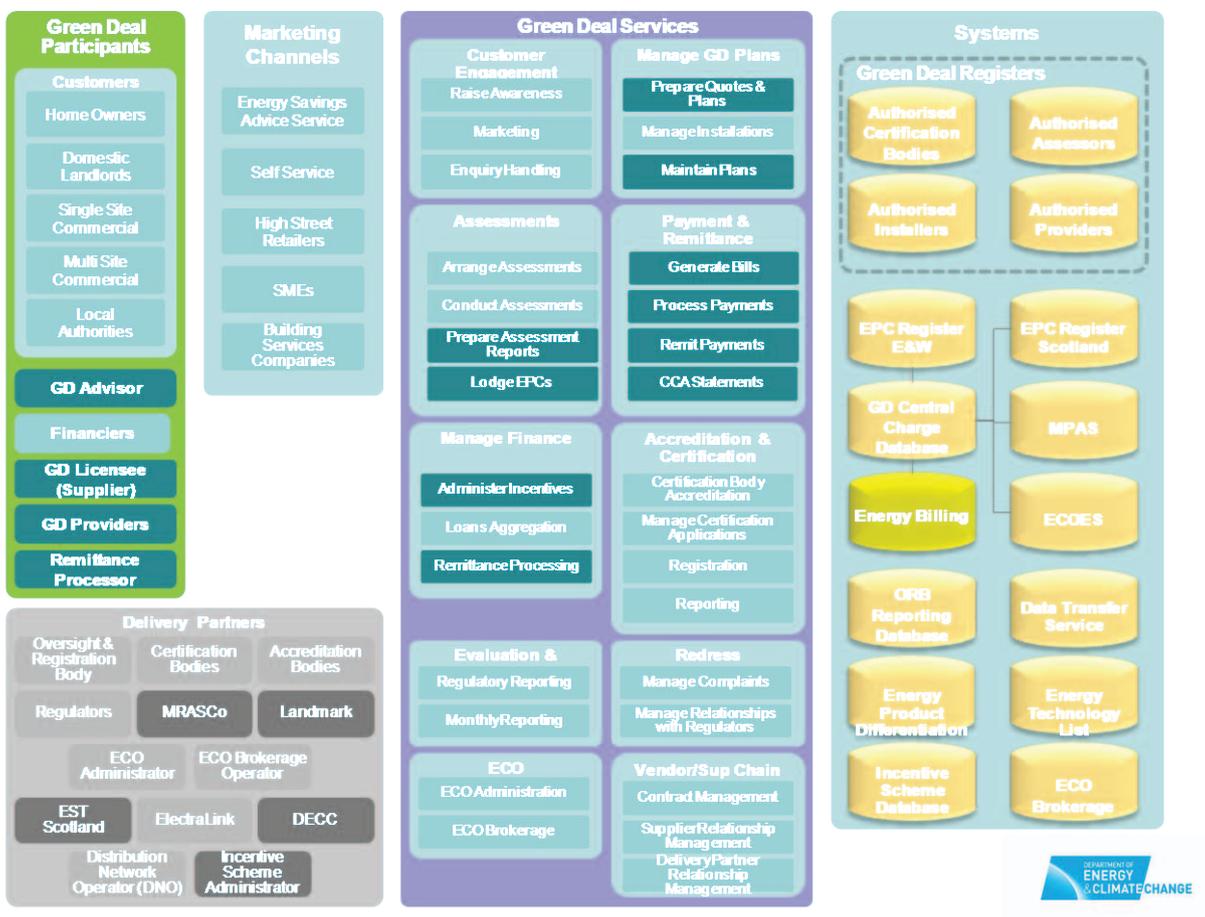
It will also provide testing participants with the opportunity to test their internal processes (and systems) and identify and issues or problems with their own operating models for the Green Deal. While each provider and electricity supplier will have different local operating processes and systems, issues and problems identified by testing participants in these areas will provide useful insight for the wider Provider and Supplier communities and enable Green Deal guidance documentation to be enhanced.

### 4.3.1 Objectives

- To gain assurance that the business requirements as defined in the Green Deal baseline will be delivered with the processes developed
- To gain assurance on the guidance being developed for Green Deal Participants

### 4.3.2 Scope

The scope of phase 1 is highlighted in the diagram below. This phase expands the scope covered in Phase 0 to include elements of the Assessment process and the role of the Green Deal Advisor.



### 4.3.3 Participants

Participants will come from the Green Deal Pioneers Groups and will cover the following Green Deal roles:

- Green Deal Advisors
- Green Deal Providers
- Green Deal Installers

- Green Deal Licensees
- Remittance Processor

All members of the Green Deal pioneers groups are not required to participate in this phase of testing. A minimum of 3 Providers and 3 Suppliers will be required to enable a robust testing process. This phase will involve the testing of a number of scenarios. Scenarios will be allocated to testing participants based on their Green Deal participant role. All participants will not be required to execute all tests.

In addition to representative Providers, Assessors and Suppliers, the following organizations will be involved in their role as Delivery Partners for the Green Deal:

- MRASCo
- ElectraLink
- Landmark
- EST Scotland
- Incentive Scheme Administrator
- DECC

During this phase of testing the role of the Incentive Scheme Administrator will be performed by DECC. Participation in this phase of testing will provide participants with confidence that their local operational processes will operate correctly.

#### 4.3.4 Participants Readiness Requirements

Participants will be selected on the basis of their willingness to participate and readiness. Readiness is defined as follows:

- Participants have participated in Phase 0
- Participants have confirmed that they understand the principles of sending information over the DTN
- Participants are familiar with the Green Deal data flows and how flows are constructed
- Participants have an MPID and role code for the Green Deal.

#### 4.3.5 Approach

This phase of testing build on the approach taken in Phase 0, adding in more detailed and complex scenarios and more rigour to the test data.

Two cycles of conference room tests will be run, each with a duration of 2 weeks. There will be a gap of 2 weeks between completing cycle 1 and commencing cycle 2. This is to enable issues identified during cycle 1, including errors in the testing materials, to be resolved before cycle 2 starts.

A set of paper templates will be used to record the inputs and outputs to each process step. The completed templates will be passed between Green Deal participants to simulate the passing of information electronically. As the GDCC will not be available at this stage of testing, an individual will “play” the role of the GDCC, generating paper data flows in response to the flows submitted to the GDCC by Providers and Suppliers. Participants will use the guidance documents provided by DECC to support the activities they are required to undertake in order to test that the guidance documents are complete and correct.

During this phase of testing, participants will work from their own offices. Regular conference calls/online meetings will be used to facilitate the process of identifying and resolving issues.

#### 4.3.6 Dependencies

Commencement of Conference Room Testing is dependent on the following:

- readiness and availability of participants
- availability of guidance documents

## 4.4 Phase 2A – End to End Testing

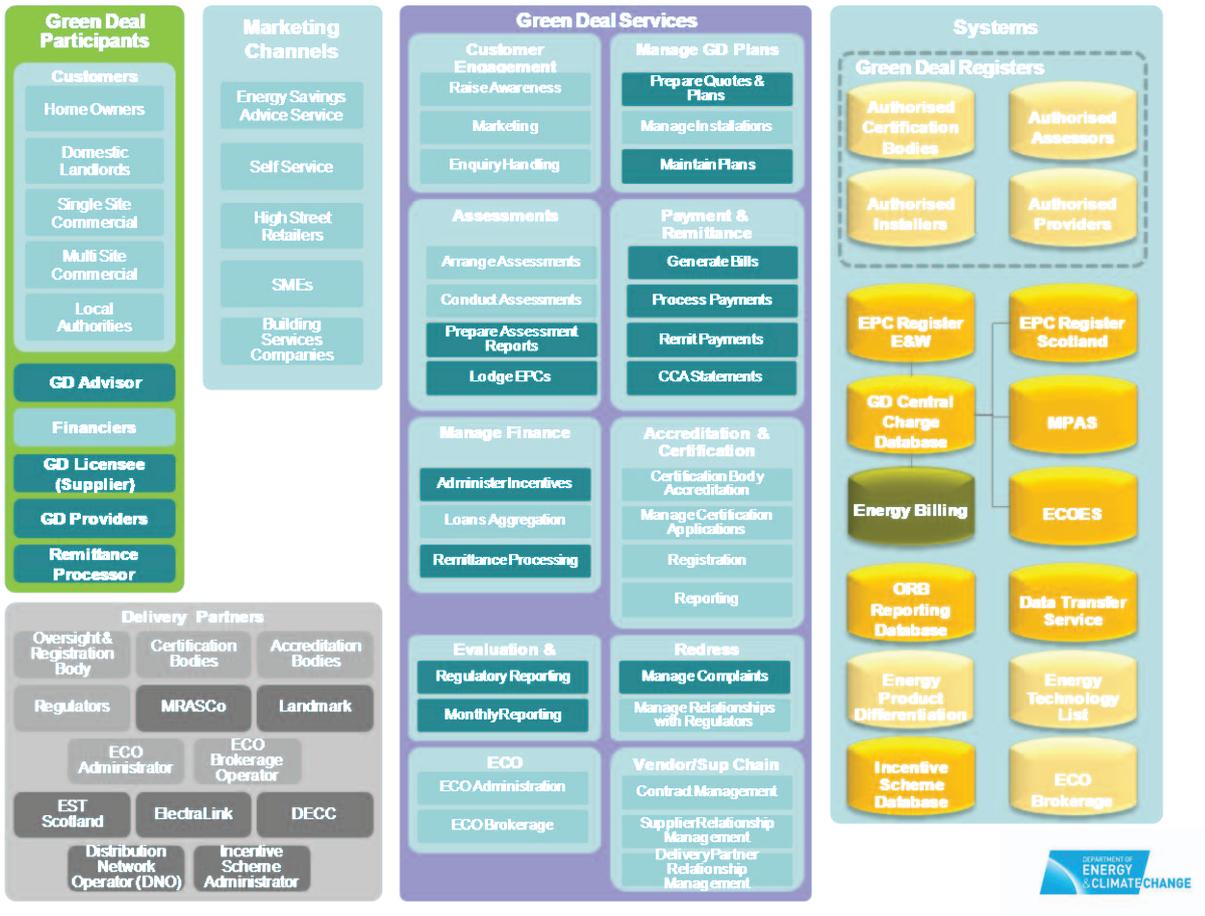
Phase 2A will involve the execution of a set of end to end tests involving both processes and systems. The core Green Deal systems i.e. GDCC, EPC registers (Landmark and EST Scotland) will be used by testing participants to execute the test scenarios. This will provide assurance that the end to end market processes and systems work as intended. The test scenarios in scope will reflect the overall priority of different processes/business requirements.

### 4.4.1 Objectives

- To gain assurance that the business requirements as defined in the TOM will be delivered with the processes and systems developed
- To gain assurance on the guidance being developed for Green Deal Participants

### 4.4.2 Scope

The scope of this phase of testing is illustrated in the diagram below. This phase builds on the testing undertaken in Phase 1, adding in the EPC registers, GDCC and supplier billing systems. The test steps in the phase will be conducted, where practical, in real time i.e. following the timings that will apply in the business as usual environment



#### 4.4.3 Participants

Participants will come from the Green Deal Pioneers Groups and will cover the following Green Deal roles:

- Green Deal Advisor
- Green Deal Installer
- Green Deal Providers
- Green Deal Licensees
- Remittance Processors

All members of the Green Deal pioneers groups are not required to participate in this phase of testing. A minimum of 3 Providers and 3 Suppliers will be required to enable a robust testing process. In addition to representative Providers, Assessors and Suppliers, the following organizations will be involved in their role as Delivery Partners for the Green Deal:

- MRASCo
- ElectraLink

- Landmark
- EST Scotland
- DECC

#### 4.4.4 Participants Readiness Requirements

Participants will be selected on the basis of their willingness to participate and readiness.

Specifically, Providers will be required to have:

- A test MPID and role code
- Access to the DTN
- Access to the GDCC
- Local operational systems which have completed local systems testing and demonstrated their ability to send and receive data flows over the DTN

Suppliers will be required to:

- confirm that their local systems have been updated to comply with the requirements of the Green Deal market processes.

#### 4.4.5 Approach

A series of test scripts which build on the scripts used in phase 1 will specify the market process steps that need to be undertaken by a participant in order to execute a specific business scenarios. As with the earlier phases, these scripts will be independent of local systems and require the participant to utilise DECC guidance documentation to determine the specific steps that they need to undertake. This will provide assurance that market processes, supporting systems and guidance documents operate correctly.

The testing included in this phase will be a mix of short, discrete tests which can be executed over a period of a few days and longer, more complex tests which will run over a period of weeks.

#### 4.4.6 Dependencies

Commencement of end to end testing is dependent on the following:

- availability of the GDCC and EPC registers in a test environment

- readiness of participants (processes and systems)
- availability of guidance documents

## 4.5 Phase 2B – Live Running

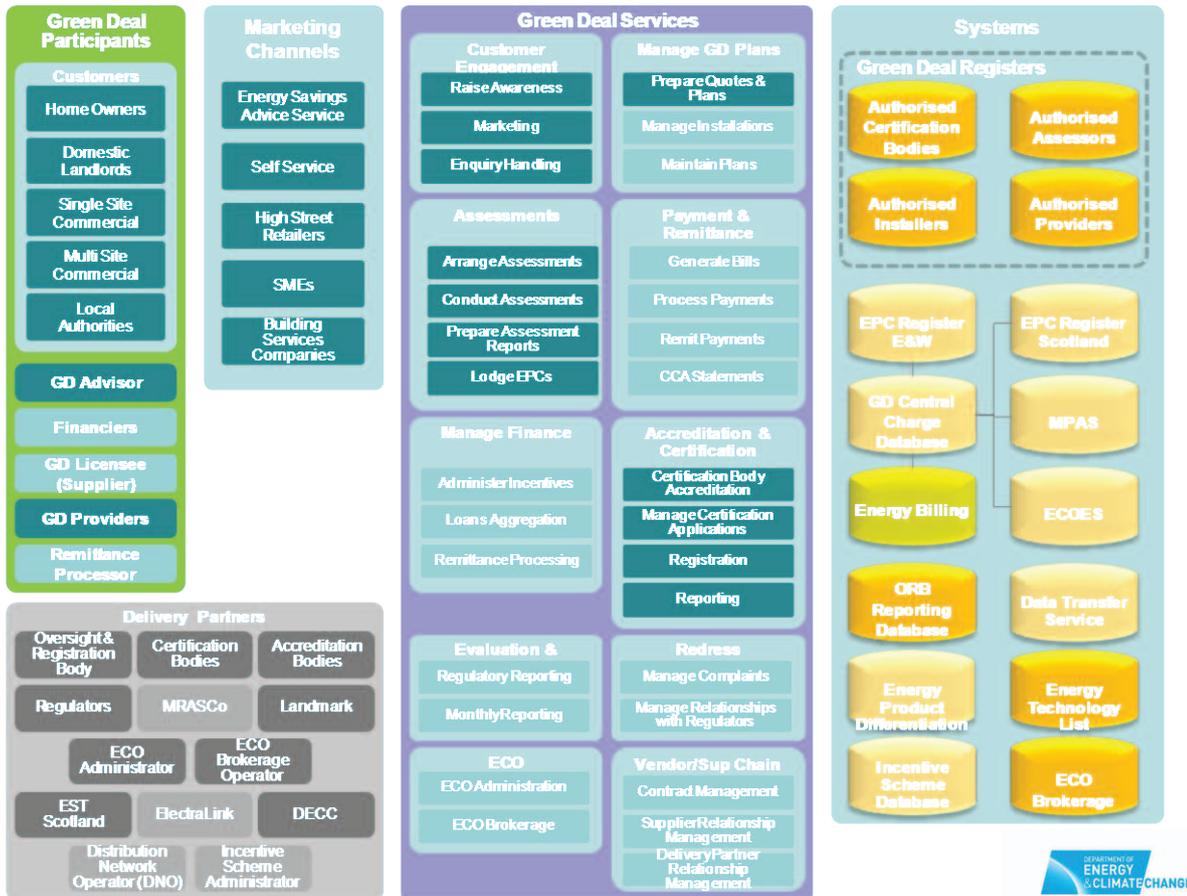
During the period prior to Green Deal providers being able to sign Green Deal Plans, a number of other Green Deal activities will be taking place. Assessors will be able to deliver Green Deal Assessments and Providers will be able to have initial discussions with customers on Green Deal plans. The registration and oversight regime include accreditation and certification will be operational. During this period, transaction volumes will be lower than when the Green Deal framework is fully operational. This provides DECC with the opportunity to gain assurance that the processes associated with this activities are working correctly and to identify improvement opportunities which can be implemented as transaction volumes increase and learning which can be shared with the wider Green Deal participant community to improve the overall Green Deal operation.

### 4.5.1 Objectives

- To identify issues and improvement opportunities from initial operations
- To gain assurance on process areas which are not within the scope of E2E testing

### 4.5.2 Scope

The scope of Phase 2B – Live Running is illustrated below.



### 4.5.3 Participants

The following Green Deal Delivery Partners will be involved during this initial period of live running:

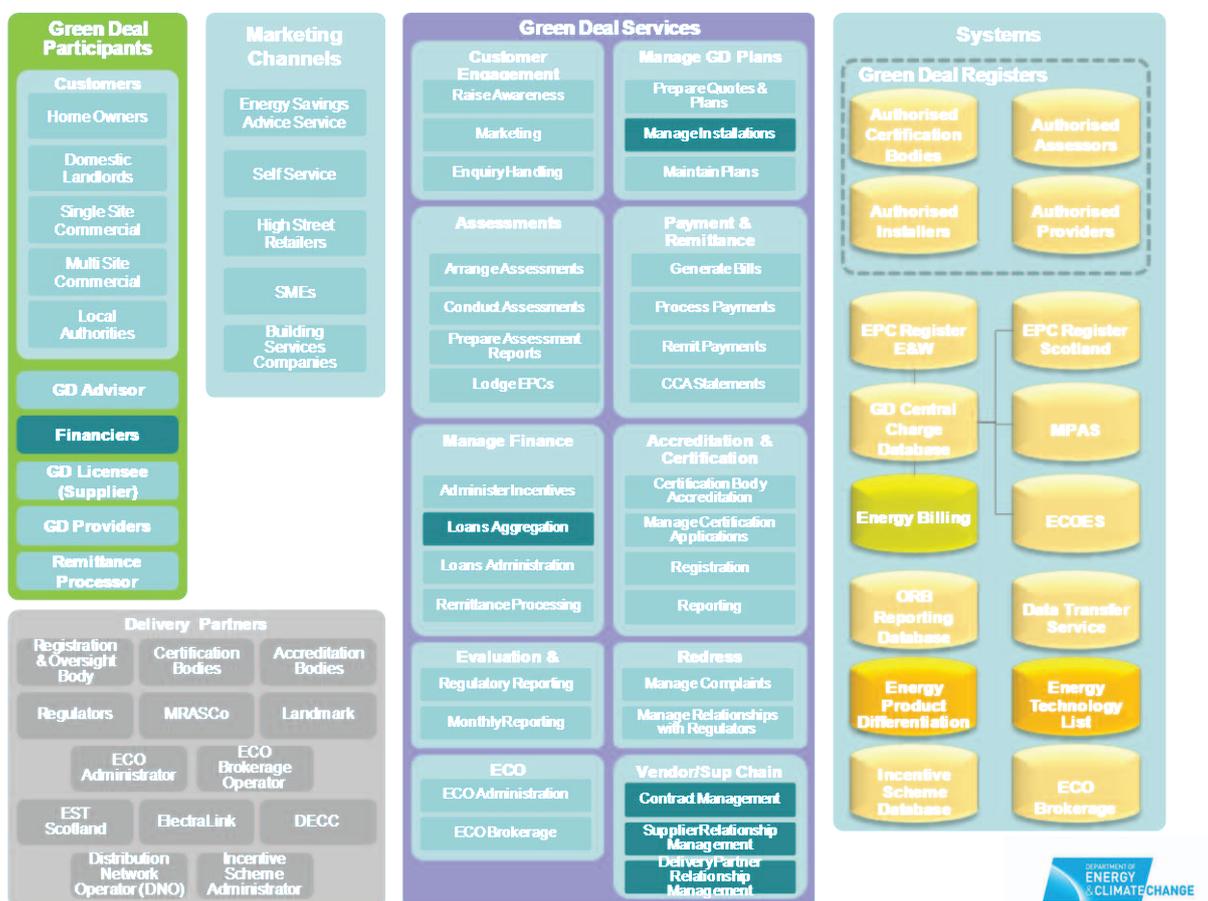
- Green Deal Advisors
- Green Deal Providers
- Registration and Oversight Body
- Certification Bodies
- Accreditation Bodies
- Landmark & EST Scotland
- ECO Administrator
- ECO Brokerage Operator
- Energy Savings Advice Service
- DECC

## 4.5.4 Approach

A series of monitoring and review activities will be undertaken to check that operational processes are running smoothly and as intended. At the same time, a process will be implemented to quickly capture any operational issues and manage the process of agreeing appropriate resolutions. This process will run as part of the overall test issue management process. These activities will be defined and taken forward as part of the Transition to Go-Live workstream within the DECC programme team.

## 4.6 Exclusions

The components of the Green Deal business architecture which are not tested as part of Green Deal market process testing are highlighted in the diagram below:



Green Deal Participants:

- There will be no financier ready to operate or in place during the GDMT testing period

Delivery Partners

- The Incentive Scheme Administrator will not be appointed in time to participate in testing activities

#### Green Deal Services

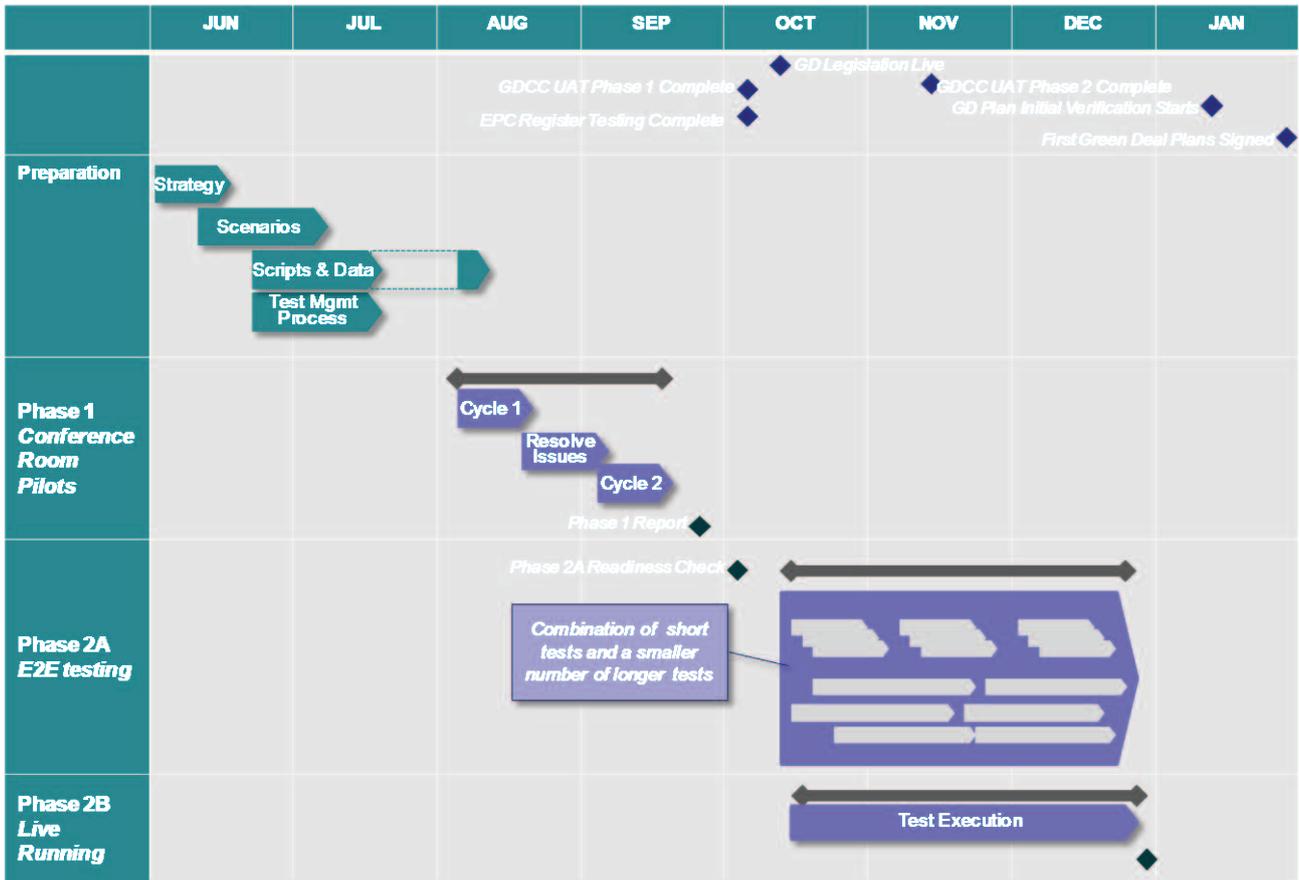
- Manage Installation
- Loans Aggregation – this will use industry standard process and only happen once a significant number of Green Deal plans with Green Deal finance have been taken out
- Contract Management – the activity will use processes which are already well proven in a business as usual environment.

## 5. Participants and Organisation Responsibilities

Testing will involve the following participants:

Participants/Organisations	Key Activities
DECC	<ul style="list-style-type: none"> <li>• Management of the overall test execution process.</li> <li>• Management of the test issues resolution process.</li> </ul>
MRASCo (as operators of the GDCC)	<ul style="list-style-type: none"> <li>• Operation of the GDCC for test execution purposes</li> <li>• Documenting test results</li> <li>• Documenting issues identified</li> <li>• Supporting issue resolution as appropriate</li> </ul>
Landmark	<ul style="list-style-type: none"> <li>• Operation of the EPC Register for England and Wales for test execution purposes</li> <li>• Documenting test results</li> <li>• Documenting issues identified</li> <li>• Supporting issue resolution as appropriate</li> </ul>
EST Scotland	<ul style="list-style-type: none"> <li>• Operation of the EPC Register for Scotland for test execution purposes</li> <li>• Documenting test results</li> <li>• Documenting issues identified</li> <li>• Supporting issue resolution as appropriate</li> </ul>
Green Deal Providers	<ul style="list-style-type: none"> <li>• Execution of test steps associated with setting up Green Deal plans, receiving and processing remittance notices and ongoing changes to the Green Deal plan arising from changes to the customer</li> <li>• Documenting test results</li> <li>• Documenting issues identified</li> <li>• Supporting issue resolution as appropriate</li> </ul>
Energy Suppliers	<ul style="list-style-type: none"> <li>• Execution of test steps associated with receiving Green Deal data flows from the GDCC</li> <li>• Execution of test steps associated with Green Deal payments and the generation of remittance notices.</li> <li>• Documenting test results</li> <li>• Documenting issues identified</li> <li>• Supporting issue resolution as appropriate</li> </ul>
Remittance Person	<ul style="list-style-type: none"> <li>• Execution of test steps associated with processing remittance notices where a provider has specified a separate remittance processor.</li> <li>• Documenting test results</li> <li>• Documenting issues identified</li> <li>• Supporting issue resolution as appropriate</li> </ul>

# 6. Testing Schedule



# 7. Issues & Risks

## 7.1 Issues

A number of Issues associated with the testing strategy and contents of this document have been identified and will be monitored throughout the duration of the testing stage of the programme.

#	Title	Description	Priority	Impact	Actions
1	Baselined Requirements	There is no single, baselined set of requirements for the Green Deal.	H	There is no common, shared understanding of the Green Deal framework or basis for assessing whether or not systems and processes are working correctly	Document the Green Deal Target Operating Model
2	GDCC System Readiness	The GDCC will be not available for integration testing prior to October 2012	H	It is not possible to do full end to end testing prior to October.	Carry out 2 phases of testing; one without systems in the period before October 2012 and one with systems in the period between October and December 2012
3	EPC Register Readiness	The EPC Registers for England & Wales and for Scotland will not be available for end to end/market level testing prior to October 2012.	H	It is not possible to do full end to end testing prior to October.	Carry out 2 phases of testing; one without systems in the period before October 2012 and one with systems in the period between October and December 2012
4	Energy Supplier Billing Systems Readiness	The billing systems for a number of energy suppliers will not incorporate the changes required for Green Deal in advance of October	H	It may not be possible to carry out tests involving supplier billing systems before October 2012.	Carry out 2 phases of testing; one without systems in the period before October 2012 and one with systems in the period between October and December

#	Title	Description	Priority	Impact	Actions
		2012.			2012
5	Energy Sector Model Office Environment	There is no pre-existing model office type environment for the energy sector. This means that a new environment will need to be established and maintained if we are to run full end to end testing,	H	There is no pre-existing set of energy related data which can be used to support testing	Investigate feasibility of creating a test data set. Investigate feasibility of gaining permission from project staff to use their MPANs and associated data for testing.

## 7.2 Risks

A number of risks associated with the testing strategy and contents of this document have been identified and will be monitored throughout the duration of the testing stage of the programme.

#	Title	Description	Likelihood	Impact	Mitigating Actions
1	Participation	The range of Green Deal participants prepared to participate in testing does not give us full coverage of the Green Deal roles.	H	M	It is unlikely there will be an independent Remittance Processor ready to participate in either Phase 1 or Phase2. Assume the role of the Remittance Processor will be carried out by a Green Deal Provider.
2	Test Environments	Green Deal delivery partners are unable to provide test environments			Run tests in the production environment where this does not place significant risk on business as usual; operations (i.e. DTN)
3	Systems Readiness	Participant's systems are not ready in time to participate in testing			Carry out an assessment of potential participant readiness Monitor participant progress against their local plans to gain early insight into any issues.

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