

*Please fill in the form in the grey spaces, by following the instructions in italic.*

<b>Requesting country:</b>	<i>South Africa</i>
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<b>Request title:</b>	<i>Request for Technical assistance on the piloting of Sustainable Drainage Systems (SuDS) in the Gauteng Province of South Africa.</i>
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<b>Contact information:</b>		
<i>{Please fill in the table below with the requested information. The request proponent is the organization that the request originates from, if different from the National Designated Entity (NDE).}</i>		
	<b>National Designated Entity</b>	<b>Request Applicant</b>
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<b>Technology Needs Assessment (TNA):</b>
<i>{Select one of the three boxes below:}</i>
<input checked="" type="checkbox"/> <i>The requesting country has conducted a TNA and specifically included water efficiency technologies and rain water harvesting. The TNA was published in September 2007 and is being updated.</i>
<input type="checkbox"/> <i>The requesting country is currently conducting a TNA</i>
<input type="checkbox"/> <i>The requesting country has never conducted a TNA</i>
<i>{If the requesting country has completed a TNA, please indicate what climate technology priority this request directly relates to. Please indicate reference in TNA/TAP/Project Ideas.}</i>

**CTCN Request Incubator Programme:**

*{Please indicate if this request was developed with support from the Request Incubator Programme:}*

- Yes  
 No

**Geographical focus:**

*{Select below the most relevant geographical level for this request:}*

- Community-based  
 Sub-national  
 National  
 Multi-country

*{If the request is related to the sub-national or multi-country level, please indicate here the areas concerned (provinces, states, countries, regions, etc.)}*

**Theme:**

*{Select below the most relevant theme(s) for this request:}*

- Adaptation to climate change  
 Mitigation to climate change  
 Combination of adaptation and mitigation to climate change

**Sectors:**

*{Please indicate here the main sectors related to the request. e.g. energy, industry, transport, waste, agriculture/fisheries, forestry, water, ecosystem/biodiversity, coastal zones, health, education, infrastructure/human settlement, tourism, businesses, early warning/disaster reduction, institutional design and mandates, cross-sectorial}*

*The proposal is for infrastructure/human settlements, water, eco-systems, disaster management, cross sectorial.*

**Problem statement (up to one page):**

*{Please describe here the difficulties and specific gaps of the country in relation to climate change, for which the country is seeking support from the CTCN. Please only provide information directly relevant to this request, and that justifies the need for CTCN technical assistance.}*

*South Africa is a developing country that has nine provinces, with Gauteng the smallest in size with an area of approximately 18 178km<sup>2</sup> (1.4% of the total surface area of South Africa). It is however the most populated province in the country with over 12 million population, most of whom live in urban areas (STATS SA: 2011). This puts a strain on the allocation of resources and infrastructure requirements, as well as resulting in impacts to the natural water cycle (increasing runoff, decreasing infiltration and so forth). Developing countries experience the following problems: high demand on resources and less supply leading to shortages (e.g. water shortage), inadequate urban planning due to exponential population growth, increasing numbers of informal settlements, failing stormwater drainage systems, high levels of unemployment, etc. This has prompted the need for*

*technical assistance in finding ways / technologies that will improve the management of stormwater and provide more effective water supply and treatment.*

*Sustainable (Urban) Drainage Systems (SuDS) is the “principle for surface water management based on managing surface water as close as possible to where it falls by mimicking natural paths and processes. SuDS fulfil the joint objectives of quality, quantity and amenity using a wide toolbox of techniques (manufactured or ‘natural’) to deliver attenuation, infiltration, flow control and water treatment”. SuDS definition is used interchangeably with Water Sensitive Design definition used in the Water Research Commission Studies referred to later in this proposal.*

*SuDS technologies such as rainwater harvesting, storage, quality recovery of urban runoff and reuse are useful for buffering seasonal water shortages and providing a partial remedy for inter-drought water stresses. This approach reduces the quantity of rainwater going into the drainage system; hence a decreased volume of runoff to be controlled. Stormwater runoff, which used to be regarded as a waste product is now recognized as a valuable resource that can no longer be discarded. However in South Africa stormwater is still mostly treated as a waste product.*

*Issues of climate resilience in terms of both flooding and droughts will be addressed as part of this proposal. Adapting stormwater systems to climate change involves design and planning considerations for new drainage infrastructure and performance enhancement on existing technologies. The design of minor and major stormwater management systems is usually based on data from historical climate/rainfall and flooding events such as 1 in 5 up to 1 in 25 year storm events. Floodlines determination along natural streams is based on 1 in 50 and 1 in 100 year storm events. However, with climate change and the increase in impervious surfaces due to urbanization, these historical events are a poor predictor of future events and are therefore insufficient for design and planning. Hence the proposed design calculation of SuDS in the pilot areas could be used as a benchmark in future to more accurately represent the climatic projections in South Africa.*

#### **Brief description of the potential project pilots**

**(a) Zendai Project / Modderfontein regeneration project:** *This development will cater for 100 000 residents and will require an investment of R84 billion over the full development period. It is subdivided into 8 sub- projects: a town centre, an international conference and exhibition centre; an international residential community; education and training centre; a business, trade and logistics parks; and the light industry. This development is a project of the private sector; hence it being collaborated in the SuDS project to assist in getting a buy in from the private sector developments. The development was also selected as a pilot because of its location and the fact that the area has extensive environmental assets and wetland systems, which are required to be conserved and protected. Therefore there are many opportunities for including SuDS technologies in the design of this development and the main focus is enhancement of ecological systems functioning.*

**(b) Corridors of Freedom project:** *The development of the planned Corridors of Freedom will improve urban mobility and ensure a smart, fair and united Johannesburg. This SuDS pilot will focus on the Louis Botha corridor, which crosses Johannesburg from North to South (ends in Johannesburg CBD) and truncates densely populated suburbs such as Braamfontein, old suburbs with larger stands and passes next to the very densely populated township of Alexandra and commercial areas. This development is a project of the public sector, the success in implementation of the SuDS option can serve as a baseline for future public (state owned) developments. The Bus Rapid Transport in this corridor is currently under construction and densification plans are being prepared. This development was selected as a pilot because of its location and the fact that South Africa is in the process of building people centre cities- bus rapid systems being one of the major projects as indicated in the National Development Plan 2030. (<http://www.reavaya.org.za/news-archive/march->*

2014/1012-rea-vaya-style-transport-orientated-development-a-must). The SuDS technologies around major transport route should be very different from ones used in development where land is available and main focus is to design SuDS applicable for urban densification.

- (c) The Ekurhuleni Human Settlement Project:** This project aims to redesign human settlements in Ekurhuleni by introducing urban conservation agricultural practices through sustainable water use. The Ekurhuleni Human Settlements re-design project intends to incorporate many low-cost SuDS technologies so that the communities can utilise stormwater and rain water for urban agriculture to create jobs and improve food security within the community. This development is a project of the public sector, likewise with the above, it will serve as a baseline for similar developments which are state owned. The aim is to transform the use of water through infrastructure redesign, flood attenuation ponds, surface water channels, community water parks, effective showers, grey water re-use and rainwater harvesting that in combination with urban agriculture will build climate resilience within communities. The main focus of introducing SuDS technologies in low income settlements is to find designs that will benefit community.

**Past and ongoing efforts (up to half a page):**

{Please describe here past and on-going processes, projects and initiatives implemented in the country to tackle the difficulties and gaps explained above. Explain why CTCN technical assistance is needed to complement these efforts, and how the assistance can link or build on this previous work.}

**Past and ongoing efforts**

Below are initiatives/ projects in the Gauteng Province that are implemented and ongoing, listed according to the major role players that conducted them, dating back to the past few years. It is important to note that the initiatives or projects selected were chosen based on the fact that the potential pilot projects are in Gauteng Province, hence the need to reflect what has been implemented and is in the pipeline for the province. In future the project will be extended to national level, so past and on-going efforts for such areas were examined as well.

- (a) City of Johannesburg:** A Catchment Management Policy (CMP) has been developed to regulate all developments adjacent to watercourses, flood plains and wetlands. A Stormwater By-Law has been developed and approved by the council. The municipality also developed a Stormwater Design Manual that informs construction companies and residents of the types of drainage systems that could be used in stormwater management and will be used as the guidelines for the implementation of the By-Laws.
- (b) Water Research Commission (WRC):** initiatives from the WRC that deal with Stormwater drainage include the following: Water Sensitive Urban Design (WSUD) for South Africa which is a Framework and provides guidelines; the WSUD web-site (<http://wsud.co.za/>) which is used for knowledge exchange and sharing and the WRC Lighthouses (<http://www.wrc.org.za/pages/LHI-WaterSensitiveDesign.aspx>) which are transdisciplinary, multi-departmental and inter-institutional mega-projects examining priority water issues across the innovation value chain.
- (c) Gauteng City Region Observatory (GCRO):** The GCRO published a report on the State of Green Infrastructure in the Gauteng City-Region (GCRO: 2013). This report acknowledges that South African water policies are the most progressive in the world, but the Gauteng City Region (GCR)'s hydrological network is faced with various challenges brought about by the poor management of natural and man-made hydrological systems. GCRO is also planning to develop a Green Infrastructure Master Plan, which will benefit from outcomes of this project.
- (d) Modderfontein regeneration / Zendai Project:** The Stormwater Management Plan for the Zendai project has already been developed by Chris Brooker and Associates (CBA Specialist Engineers)

*in November 2008 to describe the possible measures that are proposed to mitigate the impact of the planned development on the stormwater runoff from this development. Some of the SUDS techniques and design principles include: disconnected impervious areas; roof storage; green roofs; bio retention and bio filtration; constructed wetlands; grassed swales; permeable paving and rainwater harvesting.*

**(e) City of Ekurhuleni/ Ekurhuleni Metropolitan Municipality (EMM):** *EMM municipality has a Climate Change strategy for the region that includes climate change mitigation and ensuring that the infrastructure within the region is more resilient. The development of a Bioregional Plan for the municipality has been completed and environmentally sensitive areas have been included in all spatial development frameworks within the region. A stormwater policy, with SUDS guidelines have been developed as part of the guiding regulatory principles of the local authority.*

**(f) City of Cape Town**

*The Cape Town Spatial Development Framework (CTSDF) was approved in May 2012 and incorporated sustainable stormwater management, particularly in Design guidelines for recreational spaces. Since Gauteng is also busy with developing its updated SDF, the CTSDF might be used for benchmarking.*

**Assistance requested (up to one page):**

*{Please describe here the scope and nature of the technical assistance requested from the CTCN and how this could help address the problem stated above and add value vis-à-vis the past and on-going efforts. Please note that the CTCN facilitates technical assistance and is not a project financing mechanism.}*

*In order to effectively address the climate challenge, specifically the issue of changing rain patterns which has a number of negative impacts, a rapid and radical transformation is required in respect of the current method of stormwater management. These negative impacts include:*

- *Increasing and ongoing costs in repair and maintenance of stormwater systems due to overloading of existing infrastructure.*
- *Disruption of the hydrological regime, i.e. reduced groundwater recharge.*
- *Increased total levels of stormwater flows and flash floods, causing the need for larger sized infrastructure.*
- *Damage to and loss of vegetation and associated ecosystems due to higher levels of pollutants being transported by stormwater.*
- *Stressed catchments, caused by changes in sediment transportation dynamics and flooding.*

*This project aims to reduce the adverse effects of climate change on human beings and natural systems by investigating and quantifying the potential benefits of SuDS implementation. The proposal suggests three pilots which will require diverse SuDS technologies as described above.*

*The following assistance is required:*

**Phase 1: Assessment of the status quo in selected 3 pilot projects, two within City of Joburg and one in City of Ekurhuleni**

*A status -quo study will be completed to define the problems with the current drainage systems in the City of Johannesburg and Ekurhuleni. In particular, the current methodology for stormwater design based on historical rainfall patterns should be reviewed and alternative methodology based on projected rainfall patterns proposed.*

**Phase 2: Identification of suitable technologies for SUDS for the 3 pilot projects**

*Advice on the different types of SuDS technologies that will be used for the three above-mentioned pilot projects and inputs into current development plans and stormwater / SuDS design specifications. The hydrology and geohydrology of affected catchments will be considered as well as long term urbanization plans. Demand management such as the opportunities to reduce potable water use for activities that do not require potable-quality water such as irrigation or water parks, should also be included.*

**Phase 3: Development of implementation proposals**

*Develop implementation proposals for SuDS in three pilots, including cost assessments and cost benefit analysis in consultation with the municipality and relevant stakeholders. For each pilot, after evaluation of technologies identified in Phase 2, just a few interventions that will have biggest improvements, should be selected for cost benefit analysis. It is critical to quantify the long term costs and benefits of proposed SuDS compared to current stormwater systems.*

*In most situations SuDS have shown to be less expensive to install and maintain than a traditional drainage systems. There are exceptions, for example if SuDS technology requires substantial high value land use, it could potentially lead to significant increases in the cost of implementation. However in many cases SuDS can be incorporated into the open space requirements or be designed so that it is a multifunctional use of space such as a permeable parking.*

*The exact conditions that make SuDS more financially beneficial than traditional technologies are varied and associated factors are: land value, soil type, groundwater vulnerability, design criteria, design features, location and whether the development has not yet been built or SuDS is retrofitted to an existing development.*

*The costs and benefits of SuDS are very site specific and it is difficult to quantify overall environmental benefits. Different SuDS technologies will need different approaches to the cost benefit analysis. Therefore this proposal selected 3 very different cases to develop methodologies for cost benefit analysis appropriate for different suites of technologies.*

**Phase 4: Tailored training and capacity building**

*Knowledge transfer and training of the officials involved in preparation of development plans and Stormwater design to ensure their capability for implementing pilot projects. Training should be extended to consultants who support the design in 3 selected case studies.*

*Capacity building will be achieved through involvement of local project team in all phases of the projects, from providing inputs to analysis and review of draft deliverables.*

**Expected benefits (up to half a page):**

*{Please outline here the medium and long-term impacts that will result from the CTCN technical assistance, including how the assistance will contribute to mitigate and/or adapt to climate change.}*

*The following are the expected impacts that will come about from the project:*

**(a) Medium-term impacts**

*The participation in the development of the implementation plans with ongoing knowledge*

*transfer will raise awareness of developers, consultants, engineers and city and province officials, town planners and other decision makers about the applicability of SUDS for different local scenarios and development options.*

*Increased knowledge and awareness of alternative technologies and approaches will improve stormwater drainage design and incorporate climate resilience considerations.*

**(b) Long-term impacts**

*This request will assist in developing a baseline for adaptation related responses, and could result in a framework that will be implemented nationally. The consultation with National Department of Environmental Affairs is in progress to incorporate SuDS into the National Climate Change Adaptation Strategy. The research proposal may in future assist in drafting national guidelines for drainage systems.*

*The uptake of SuDS in South Africa and later in southern African countries will be increased. Results obtained from this study will be shared to various decision makers in the country and will be made available for southern African countries through partnership with the WRC.*

*The results obtained from this study will assist in updating the guidelines for the Environmental Impact Assessment (EIA).*

*The implementation of SuDS technologies will result in a decrease in flooding and increase in water availability and consequently improve climate resilience.*

**Post-technical assistance plans (up to half a page):**

*{Please describe here how the results of the CTCN technical assistance will be concretely used by the applicant and national stakeholders, to pursue their efforts of resolving the problems stated above after the completion of the CTCN intervention (list specific follow-up actions that will be undertaken).}*

*Results will be used to:*

- *Promote SuDS through awareness programs and practical interventions.*
- *Develop an evaluation project report which will provide an appraisal on how the pilot implementation plans have been developed and how the project team has been able to transfer the knowledge and skills to relevant stakeholders.*
- *To share best practice on how to manage Stormwater and how the country can sustain itself despite the negative effects of climate change.*
- *To increase peoples' knowledge on relevant and advanced technological and natural means of dealing with Stormwater.*
- *Engage government, business, civil society etc. through a platform which promotes sustainability in terms of drainage systems.*
- *The knowledge obtained through this project will feed into the adaptation related responses, and may result in a framework that will be implemented nationally.*

**Key stakeholders:**

*{Please list in the table below the main stakeholders who will be involved in the implementation of the*

*requested CTCN technical assistance, and what their role will be in supporting the assistance (for example, government agencies and ministries, academic institutions and universities, private sector, community organizations, civil society, etc.). Please indicate what organization(s) will be the main/lead counterpart(s) of CTCN experts at national level, in addition to the NDE.}*

<b>Stakeholder</b>	<b>Role to support the implementation of the assistance</b>
<p><i>Lynn Marais Environmental Manager of Zendai Development</i> Contact details: 011 579 1000 <a href="mailto:lynnm@zendaisa.co.za">lynnm@zendaisa.co.za</a></p>	<p><i>Support the piloting of suites of SuDS technologies, provide information on existing plans and contribute cost benefit analysis and improved plans.</i></p>
<p><i>Jane Eagle</i> Deputy Director: Open Space Planning Water Management and Biodiversity Directorate (Environment and Infrastructure Services Department City of Johannesburg) Contact details: 011 587 4271 <a href="mailto:JaneE@joburg.org.za">JaneE@joburg.org.za</a></p>	<p><i>Provide information on existing plans and contribute to cost benefit analysis and improved plans.</i>  <i>Will also help with coordination with other City's entities, such as Joburg Water, City Parks and Joburg Roads Agency.</i></p>
<p><i>Andre Nel</i> Operations Manager: Roads &amp; Stormwater Planning, Johannesburg Roads Agency Contact details: 011 298 5099 <a href="mailto:anel@jra.org.za">anel@jra.org.za</a></p>	<p><i>Provide information on existing plans and contribute to cost benefit analysis and improved plans.</i></p>
<p><i>Is'haaq Akoon</i> City of Ekurhuleni Contact details: 011 999 3014 <a href="mailto:Is'haaq.Akoon@ekurhuleni.gov.za">Is'haaq.Akoon@ekurhuleni.gov.za</a></p>	<p><i>Assist with all relevant inputs needed from the EMM. Provide information on exiting plans and contributing to cost benefit analysis and improved plans.</i></p>
<p><i>Valerie Naidoo</i> Water Research Commission Contact details: 012 761 9300 <a href="mailto:valerien@wrc.org.za">valerien@wrc.org.za</a></p>	<p><i>Provide latest information on SuDS in South Africa and contribute to post project information sharing.</i></p>
<p><i>Gillian Maree</i> SA Cities Network Contact details: 011 403 5230 <a href="mailto:gillian@sacities.net">gillian@sacities.net</a></p>	<p><i>Capture the knowledge gained in the project and lessons learned, publish and share SuDS information with other municipalities.</i>  <i>Make arrangements for knowledge sharing events to discuss SuDS and help build experience.</i></p>
<p><i>Dr Kirsty Carden</i> Urban Water Management research unit at University of Cape Town (UCT) Contact details: 021 650 5317 <a href="mailto:Kirsty.Carden@uct.ac.za">Kirsty.Carden@uct.ac.za</a></p>	<p><i>Advisory and knowledge sharing role as the Water Sensitive Design Lighthouse coordinator for the WRC</i></p>
<p><i>Manglin Pillay</i> CEO: The South African Institution Of Civil Engineering (SAICE) Contact details: 011 805 5947/53 <a href="mailto:CEO@SAICE.org.za">CEO@SAICE.org.za</a></p>	<p><i>Assist with all relevant inputs needed for civil engineering, review of methodology for storm water design based on projected rainfall, review of proposed pilot designs and cost benefit analysis methodologies.</i></p>
<p><i>Sibonelo Mbanjwa</i></p>	<p><i>Assist with all relevant information related to Climate</i></p>

*National Department of Environmental Affairs*

*Climate Change Adaptation*

*Contact details: 012 399 9175*

*[Smbanjwa@environment.gov.za](mailto:Smbanjwa@environment.gov.za)*

*change. Assist incorporating the SuDS technology into the National Adaptation Climate Change Strategy*

**Alignment with national priorities (up to half a page):**

*{Please demonstrate here that the technical assistance requested is consistent with documented national priorities (examples of relevant national priorities include: national development plans, poverty reduction plans, technology needs assessments (TNAs), LEDS, NAMAs, TAPs, NAPs, sectorial strategies and plans, etc.). For each document mentioned, please indicate where the priorities specifically relevant to this request can be found (chapter, page number, etc.)}*

*This proposal is aligned with the following priorities:*

- 1. The National Climate Change Response White Paper (DEA, 2011), p.21 specifically states "poor Stormwater drainage systems and urban induced soil erosion result in flash flooding. Increased storm intensity due to climate change exacerbates such problems".*
- 2. Furthermore, the Gauteng Climate Change Response Strategy, (GDARD, 2011) specifies "All new urban developments of communal and private infrastructure are required to incorporate elements of stormwater infiltration rather than channeling it as run-off into stormwater drains". It also states "Requirements for rainwater harvesting from buildings are part of building codes for new construction."*
- 3. National Water Resource Strategy (NWRS-2 ) specifically states "maximising the use of local resources through groundwater development, water re-use, rainwater harvesting and desalination of seawater, improved systems management and the control of illegal water use will "stretch" our already limited and scarce water resources".*

**Development of the request (up to half a page):**

*{Please explain here how the request was developed at the national level and the process used by the NDE to approve the request before submitting it (who initiated the process, who were the stakeholders involved and what were their roles, and describe any consultations or other meetings that took place to develop and select this request, etc.)}*

*Information about the Climate Technology Centre and Network (CTCN) was made available to staff members of GDARD Climate Change Information and Research at the Intergovernmental Climate Change Committee and information on SuDS technologies was provided at SuDS seminar hosted by the WRC / UWM research unit in Johannesburg on 24<sup>th</sup> November 2015. The Water Research Commission shared information to delegates present. A series of consultations were held to develop an inclusive proposal with support from the following institutions:*

- 1. Zendai Development*
- 2. City of Johannesburg Open Space Planning  
Water Management and Biodiversity Directorate (Environment and Infrastructure Services*

*Department) Johannesburg Road Agency (Roads & Stormwater Planning)*

3. SA Cities Network
4. Water Research Commission
5. Department of Science and Technology
6. Urban Water Management research unit (UCT)
7. National Department of Environmental Affairs
8. The South African Institution Of Civil Engineering

**Expected timeframe:**

*{Please propose here a duration period for the assistance requested.}*

<i>Phases</i>	<i>Description of work</i>	<i>Start and End</i>	<i>Monitoring and Evaluation Tool</i>	<i>Knowledge transfer</i>
<i>Phase 1</i>	<i>Assessment of the status quo in the selected Gauteng Municipality</i>	<i>Months 1 to 6 from project commencement</i>	<i>Report</i>	<i>On-going</i>
<i>Phase 2</i>	<i>Identification of suites of technologies for sustainable stormwater drainage for 3 pilot projects</i>	<i>Months 2 to 10 from project commencement</i>	<i>Report</i>	<i>On-going</i>
<i>Phase 3</i>	<i>Development of implementation proposals</i>	<i>Months 4 to 12 from project commencement</i>	<i>Attendance Registers and Implementation proposals</i>	<i>On-going</i>
<i>Over all</i>	<i>Tailored training and capacity building for stakeholders including training on design of selected suites of technologies.</i>	<i>From project inception to closure / in all the above 3 phases</i>	<i>Course material/ manual/ guidelines</i>	<i>On-going</i>

**Note: the project timeline can be extended to 18 months if recommended by CTCN.**

**Background documents:**

*{Please list here relevant documents that will help the CTCN understand the context of the request and national priorities. For each document, provide weblinks if available, to attach to the submission form while submitting the request. Please note that all documents listed/provided should be mentioned in this request in the relevant question(s), and that their linkages with the request should be clearly indicated.}*

**References:**

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12. *GCRO, 2013 State of Green Infrastructure in the Gauteng City-Region (SOGI: 2013)* from [http://www.gcro.ac.za/media/reports/sogi\\_final\\_P6nDjP5.pdf](http://www.gcro.ac.za/media/reports/sogi_final_P6nDjP5.pdf).

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**Monitoring and impact of the assistance:**

*{Read carefully and tick the boxes below.}*

- By signing this request, I affirm that processes are in place in the country to monitor and evaluate the assistance provided by the CTCN. I understand that these processes will be explicitly identified in the Response Plan in collaboration with the CTC, and that they will be used in the country to monitor the implementation of the CTCN assistance.
- I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country.

**Signature:**

NDE name: Henry Roman

Date: 21 July 2016

Signature: 

