NATIONAL SKILL QUALIFICATION FRAMEWORK
QUALIFICATION FILE

Version 6: Draft of 01 September 2016

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Name and address of submitting body:

Skill Council for Green Jobs,
CIBP Building, Malcha Marg,
Chankyapuri, New Delhi - 110021

Name and contact details of individual dealing with the submission

Name: **Dr. Praveen Saxena**
Position in the organisation: **Chief Executive Officer**
Address if different from above: (Same as above)
Tel number(s): **9871119101**
E-mail address: **psaxena@sscgj.in**

Name: **Mr. Tanmay Bishnoi**
Position in the organisation: **Head – Standards and Research**
Address if different from above: (Same as above)
Tel number(s): **7838784433**
E-mail address: **tanmay@sscgj.in**

List of documents submitted in support of the Qualifications File

1. Qualifications Pack
2. Industry Validations letters
3. Industry Endorsement tracker
4. Integrated Occupational Map
5. Summary Sheet

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

SUMMARY

Qualification Title	Solar PV Structural Design Engineer
Qualification Code	QP SGJ/ 0109
Nature and purpose of the qualification	Nature of the qualification - A qualification pack The main purpose of the qualification - This Qualification will enable the individual to specialize in the civil and mechanical design of a rooftop or ground mount solar PV power plant
Body/bodies which will award the qualification	Skill Council for Green Jobs
Body which will accredit providers to offer courses leading to the qualification	Skill Council for Green Jobs
Body/bodies which will carry out assessment of learners	Affiliated Assessment Agency of SCGJ
Occupation(s) to which the qualification gives access	Solar PV Structural Design Engineer
Licensing requirements	N/A
Level of the qualification in the NSQF	Level 5
Anticipated volume of training/learning required to complete the qualification	200 hours
Entry requirements and/or recommendations	Diploma in Civil Engineering/Structural Engineering
Progression from the qualification	Solar PV Designer (Level 7)
Planned arrangements for the Recognition of Prior learning (RPL)	SCGJ recognizes that there may be candidates who have prior learning experience in the Renewable Energy Sector and are desirous of being certified. - Propose to carry out RPL for candidates working in Solar and power sector - A bridge course would be conducted for people who are working in solar industry. - Linking of this Qualification to Start Up India
International comparability where known	This Level 5 qualification compares with UK NOS: Level 3 UK NOS: Pro Skills Sector Skill Council PROST06. PROST07
Date of planned review of the qualification.	30th September 2019

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

Formal structure of the qualification			
Title and identification code of component.	**Mandatory/ Optional**	**Estimated size (learning hours)**	**Level**
SGJ/ N0127 Prepare the civil/ structural design of solar PV power plant	**Mandatory**	**160**	**5**
SGJ/ N0106 Maintain personal health & safety at project site	**Mandatory**	**20**	**2**
SGJ/ N0120 Work effectively with others	**Mandatory**	**20**	**4**

Please attach any document giving further detail about the structure of the qualification – e.g. a Curriculum Document or a Qualification Pack.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

NSQF QUALIFICATION FILE
Version 6: Draft of 01 September 2016

SECTION 1
ASSESSMENT

Body/Bodies which will carry out assessment:
Affiliated Assessment Agency of SCGJ

How will RPL assessment be managed and who will carry it out?
The RPL assessment will be carried out through pre assessment, identifying the skills gaps, provide bridge training to cover the competency gap, where required, and then conduct final assessment of the candidates.
Confederation of Indian Industry (CII) or any other Affiliated Assessment Agency of SCGJ, as per RPL Policy and Guidelines

Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.
The emphasis is on examination of existing businesses through case study analysis and practical demonstration of skills and knowledge based on the performance criteria.

The assessment papers are developed by Subject Matter Experts (SME) available with the Assessment Agency, in collaboration with Skill Council for Green Jobs, as per the performance and assessment criteria mentioned in the Qualification Pack. The assessments papers are also checked for the various outcome based parameters such as quality, time taken, precision, tools & equipment requirement etc. The assessment sets are then reviewed for consistency. The technical limitations at the training centres are taken care in theory and viva.

The assessment agencies are instructed to hire assessors with integrity, reliability and fairness. Each assessor shall sign a document with its assessment agency by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessments. The assessment agencies are instructed to identify assessors as per the Assessment Policy and Guidelines established by Skill Council for Green Jobs relevant for that Qualification.

The assessors selected by Assessment Agencies are scrutinized and made to undergo training and introduction to SCGJ Assessment Framework, competency based assessments, and assessors guides. The assessors are provided with assessors guide developed by the Subject Matter Expert of the assessment agency in collaboration with SCGJ as per the assessment framework. The assessment guides are developed to ensure the maximum possible consistency in the assessment by different assessors and elaborate on the following

- Qualification Pack Structure
- Guidance for the assessor to conduct theory, practical and viva assessments
- Guidance for trainees to be given by assessor before the start of the assessments.
- Guidance on assessments process, practical brief with steps of operations practical observation checklist and mark sheet
- Viva guidance for uniformity and consistency across the batch.

The assessment by assessment agency is completely based on the assessment criteria as mentioned in the Qualification Pack. Each NOS in the Qualification Pack (QP) is assigned a relative weightage for assessment based on the criticality of the NOS. Therein each Performance Criteria in the NOS is assigned marks for or practical based on relative importance, criticality of function and training infrastructure.

The following tools are proposed to be used for final assessment:

Practical Assessment: This will comprise of a test to evaluate the individual's grasp on domain skills imparted.
Viva/Structured Interview: This tool will be used to assess the conceptual understanding and the behavioural aspects as regards the job role and the specific task at hand. It will also include questions to ascertain the soft skills of interacting with the customer or client.
Written Test: Under this test few key items which cannot be assessed practically will be assessed. The written assessment will comprise of:

- True / False Statements
- Multiple Choice Questions
- Problem Statements
- Case Study Analysis

Please attach any documents giving further information about assessment and/or RPL.
Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

NSQF QUALIFICATION FILE

Version 6: Draft of 01 September 2016

ASSESSMENT EVIDENCE

Complete a grid for each component as listed in "Formal structure of the qualification" in the Summary.

NOTE: this grid can be replaced by any part of the qualification documentation which shows the same information – i.e. Learning Outcomes to be assessed, assessment criteria and the means of assessment.

Title of Component: Solar PV Structural Design Engineer

CRITERIA FOR ASSESSMENT OF TRAINEES

Job Role Solar PV Structural Design Engineer

Qualification Pack SGJ/ Q0109

Sector Skill Council Green Jobs

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion.
6. To pass the Qualification Pack, every trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

			Marks allocation		
Assessment Outcomes	**Assessment Criteria for outcomes**	**Total Marks**	**Out of**	**Theory**	**Skills Practical**
SGJ/N0127 Prepare the civil/ structural design of solar PV power plant	PC1. Carry out the structural load analysis of rooftop	**100**	15	6	9
	PC2. Design the module mounting structure for the solar PV power plants including trackers if required		15	7	8
	PC3. Decide the type of foundation suitable for module mounting structures, inverters, transformers, etc. based on the type of roof / soil test report		10	5	5
	PC4. Design the foundations for the module mounting structures		10	4	6
	PC5. Design the foundations for inverters, transformers, etc.		10	4	6

	PC6. Design the overall structural layout of the solar PV power plant		15	6	9
	PC7. Design the civil/ structural allied works of the solar PV power plant including: • compound wall /entry gate • internal plant roads • walkways between different rows of modules • water distribution network • water drainage system, etc.		10	4	6
	PC8. Document the specifications of materials, components, etc. used for foundations, mounting structures, etc.		5	3	2
	PC9. Document the assumptions used for designing the foundations, mounting structures, etc.		5	3	2
	PC10. Prepare and handover the structural design report		5	3	2
		TOTAL	**100**	**45**	**55**
SGJ/ N0106 Maintain personal health & safety at project site	PC1. Identify corporate policies required for workplace safety	**50**	2	1	1
	PC2. Identify requirements for safe work area and create a safe work environment		3	2	1
	PC3. Identify contact person when workplace safety policies are violated		1	1	0
	PC4. Provide information about incident/violation		1	1	0
	PC5. Identify the location of first aid materials and administer first aid		2	1	1
	PC6. Identify the personal protection equipment required for specific locations on-site		3	2	1
	PC7. Identify expiry dates and wear & tear issues of specified equipment		2	1	1
	PC8. Demonstrate safe and accepted practices for personal protection		3	2	1
	PC9. Identify environmental hazards associated with the project site		2	1	1
	PC10. Identify electrical hazards		4	2	2
	PC11. Identify personal safety hazards or work site hazards and mitigate hazards		4	2	2
	PC12. Select tools, equipment and testing devices needed to carry out the work		4	2	2
	PC13. Demonstrate safe and proper use of required tools and equipment		4	2	2
	PC14. Check access from ground to work area to ensure it is safe and in accordance with requirements		2	1	1
	PC15. Reassess risk control measures, as required, in accordance with changed work practices and/or		2	2	0

		site conditions and undertake alterations				
	PC16.	Inspect/install fall protection and perimeter protection equipment ensuring adequacy for work and conformance to regulatory requirements		4	2	2
	PC17.	Identify approved methods of moving tools and equipment to work area and minimize potential hazards associated with tools at heights		2	1	1
	PC18.	Select and install appropriate signs and barricades		2	1	1
	PC19.	Place tools and materials to eliminate or minimize the risk of items being knocked down		1	1	0
	PC20.	Dismantle plant safely in accordance with sequence and remove from worksite to clear work area		2	1	1
			TOTAL	**50**	**29**	**21**
SGJ/ N0120 Work effectively with others	PC1.	Accurately pass on information to the authorized persons who require it and within agreed timescale and confirm its receipt	**50**	4	2	2
	PC2.	Assist others in performing tasks in a positive manner where required and possible		4	2	2
	PC3.	Consult and assist others to maximize effectiveness and efficiency in carrying out tasks		4	2	2
	PC4.	Display appropriate communication etiquette while working		6	3	3
	PC5.	Display active listening skills while interacting with others at work		4	2	2
	PC6.	Demonstrate responsible and disciplined behaviors at the workplace		4	2	2
	PC7.	Escalate grievances and problems to appropriate authority as per procedure to resolve them and avoid conflict		3	1	2
	PC8.	Identify the need for common grounds with clients, team members, etc. and negotiate in an effective manner to achieve the same		3	1	2
	PC9.	Consider and respect the opinions, creativity, values, beliefs and perspectives of others		4	2	2
	PC10.	Ensure collaboration and group participation to achieve common goals		6	3	3
	PC11.	Promote a friendly, co-operative environment that is conducive to employee's sense of belonging		4	2	2

	PC12. Facilitate an understanding and appreciation of the differences among team members		4	2	2
		TOTAL	**50**	**24**	**26**

Means of assessment 1
Means of assessment 2
Pass/Fail

NSQF QUALIFICATION FILE
Version 6: Draft of 01 September 2016

SECTION 2
EVIDENCE OF LEVEL

Awarding bodies will enter a proposed NSQF level for the qualification in the Qualification File Summary. This section asks for the evidence on which that proposal is based. The evidence must refer to the level descriptors of the NSQF.

NSDA recommends an approach to working out the level of qualifications which starts with the level descriptor domains (Process, Professional knowledge, Professional skill, Core skill and Responsibility: see annex A). Two variants for providing the evidence of level are offered here: Option A and Option B in the following pages. Awarding bodies should choose the option which best suits the qualification.

NSQF QUALIFICATION FILE
Version 6: Draft of 01 September 2016

OPTION A

Title/Name of qualification/component: Solar PV Structural Design Engineer			**Level: 5**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Process	The individual is expected to design the module mounting structures, foundations for the module mounting structures, inverters and transformers and the complete layout of the solar PV power plant including walkways between the module mounting structures civil/ structural work for the control room, and allied structural works for the rooftop or ground mount solar PV power plant	The Job holder is expected to exhibit **well developed skills** with a **clear choice of procedures in familiar context** such as carrying out the structural load analysis of the project site for designing the module mounting structure and foundations, designing the mounting structures and the foundations for various equipment basis the load analysis output, designing the overall structural layout including allied works using structural design software and documenting the structural design report with the assumptions, etc. Thus considering the scope of work the job holder can be placed at Level 5 Since the individual's work is not limited to working in familiar, routine & predictable environment but rather encompasses job that requires working in non-routine and fairly unpredictable environment such as making assumptions for creating the design basis the specifications of the project site, creating designs specific to client's requirements, etc., s/he can't be placed in Level 4. And as the individual doesn't require to exhibit wide range of specialized developed skill and working around non-standard practices, it does not qualify as a level 6 role.	5
Professional knowledge	The individual is expected to exhibit the knowledge of the solar energy including the solar resource assessment terms and parameters, site survey and soil test report for evaluation purposes, typical specifications, functioning, operating principles and efficiencies of different commercially available	The Job holder is expected to exhibit **knowledge of facts such as** typical specifications and types of solar PV plant components**,** types of loads, module mounting structures, allied civil/ structural works, etc. **knowledge of principles such as** solar resource assessment principles, operating principles of solar PV components, designing principles for	5

Title/Name of qualification/component: Solar PV Structural Design Engineer			**Level: 5**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
	components of a solar PV plant for designing purposes, different types of load, module mounting structures, allied civil/ structural works, etc. for the purpose of prepare designs.	creating structural designs, **knowledge of processes like** standard operating procedures of for creating structural designs of a solar PV power plant, documentation procedures for preparing structural design report, site survey and soil testing processes **and general concepts of in the field of solar PV such as** knowledge of basics of solar energy system and power generations, solar resource assessment, etc. Thus considering the professional knowledge, s/he can be placed at level 5. The Job holder is expected to possess professional skills more than just factual knowledge about solar PV components but also knowledge of facts like site survey and soil test reports and their evaluation parameters, solar PV power output parameters like power, energy and process like load analysis and shading analysis, etc. therefore s/he can't be placed at Level 3 And since the job holder doesn't require to exhibit factual & theoretical knowledge in broad contexts within solar PV such as evolving technological trends, the various socio-economic factors and their impact on solar PV etc., the role can't be placed at Level 6	
Professional skill	The individual is expected to plan & organize the schedule for all meetings and discussions to be undertaken by self or by the team. Further s/he must be able to take decisions on a regular basis, manage relationship with customers and apply domain knowledge to perform tasks related to solar PV. S/he is also expected to critically evaluate information obtained from various sources to relevant solutions.	**The Job holder is expected to possess a range of practical and cognitive skills required to accomplish tasks and solve problems by selecting and applying basic methods and tools. For example,** the individual has to analyse the site survey and soil test reports, carry out the load analysis basis the reports and decide on the specifications of the module mounting structures and foundations, prepare the overall plant structural design including the allied civil/structural works using structural design software. S/he will also prepare the structural design	5

Title/Name of qualification/component: Solar PV Structural Design Engineer			**Level: 5**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		report and document the assumptions made while preparing the design. Thus considering the professional skills the job holder can be placed at Level 5 Since the Job holder is expected to exhibit cognitive skills along with practical skills required to accomplish the tasks and solve problems like analyzing the soil test and site survey reports, analyzing the solar radiation data, making assumptions for preparing the structural designs, etc., s/he can't be placed at Level 4. And as the job holder is not expected to possess practical and cognitive skills required to generate solutions for specific problems related to solar PV as a whole, but rather expected to generate solutions specific to the solar PV power plant, s/he can't be placed at level 6	
Core skill	The individual is expected to exhibit fluent business communications skills, networking skills & capable of handling and using customer data in the prescribed way.	The Job holder is expected to be possess the desired **mathematical skills for** carrying out the structural load analysis for preparing mounting structures and foundations, **skill of collecting and organizing information** like collecting the site survey and soil test reports and carrying out structural load analysis basis the reports, collecting the solar resource assessment data and deciding on the specifications of the various components of solar PV power plant including allied works such as piping network, drainage system, etc. and **communication skill** for so as to communicate effectively with the solar site surveyor and solar PV designer as well as with the draughtsman to provide instructions to prepare civil/ structural designs.. Thus considering the core skills, s/he can be placed at Level 5.	5

Title/Name of qualification/component: Solar PV Structural Design Engineer			**Level: 5**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		The Job holder is expected to exhibit core skills more than language to communicate with required clarity, basic algebraic and arithmetic skill and basic understanding of socio- political environment. For example, s/he is supposed to carry out load analysis and make assumptions to make design specifications, decide on the specifications on allied works like pipe networks, dimensions, pressure, etc. basis the natural environment. Hence s/he can't be placed at Level 4. And since the job holder requires only some skill of collecting and organizing information but doesn't need to be reasonably good like conducting primary and secondary research and only the desired mathematical skill restricted to preparing the civil/ structural designs, s/he can't be placed at Level 6	
Responsibility	The individual is primarily responsible for preparing the civil/ structural designs and reports through his/her team of draughtsman and assistant design engineers.	The Solar PV Structural Design Engineer is **responsible for his/ her own work** as he/she has to analyse the site survey and soil test reports and decide on the specifications of various components like mounting structures, foundations, etc. a**nd to an extent subordinate's works and learning** as s/he is expected to get the drawings prepared by her/his team of draughtsman and is hence responsible for passing knowledge to the team of draughtsman and ensuring the that the work allocated to them is carried out within the stipulated time. Considering the responsibilities the individual can be placed at level 5. Since the Job holders responsibility is not limited till only his/her own work & learning but also encompasses some	5

Title/Name of qualification/component: Solar PV Structural Design Engineer			**Level: 5**
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
		responsibilities for others learning as s/he is expected to ensure knowledge transfer to team members s/he can't be placed at 4. As the responsibilities are not so broad enough to be fully responsible for other's work and learning like conducting trainings, taking disciplinary actions in case of deviations from organisation conduct rules, etc. s/he can't be placed at level 6.	

India-EU Skills Development project:
Qualification File

SECTION 3
EVIDENCE OF NEED

What evidence is there that the qualification is needed? During extensive industry interactions carried out while creating occupational maps and prioritization of job roles for Qualification Pack development, the mentioned qualification was indicated as a key requirement by the industry. In addition, the Skill Gap Report for the sector has indicated that a significant proportion of the workforce is involved in this work function. The study also indicates that this domain will be in great demand, due to focus of Government of India to support the sector through policy and implementation. Research was conducted in the Renewable energy sector manpower requirement estimates till 2025. The research provides the data that the discussed qualification is one of the critical roles in the sector. The details of statistics and research analysis are provided separately as a research analysis report Evidence of the qualification is supported by validations with representation from across sub sectors .The complete list of validating companies has been enclosed as an annexure to the Q file.
What is the estimated uptake of this qualification and what is the basis of this estimate? The increase in manpower requirements (as per projections) from 2017 to 2025 is approx. 11 times for this role. A requirement of approximately 6000 skilled manpower is estimated for this role. All the numbers are provided in research analysis study.
What steps were taken to ensure that the qualification(s) does/do not duplicate already existing or planned qualifications in the NSQF? Currently, Skill Council for Green Jobs is the only Sector Skill Council set up which has the mandate of Certification and Assessment of candidates undergoing Skill Development courses in Solar Photovoltaic domain. NSDC list of Approved QPs was checked prior to commissioning the work. There is no overlap of these Qualification Packs with existing Qualification Packs. The NCO/2015 Classification and MES Course List was also cross examined for existing trades, wherein no overlap / existing trade was found.
What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? In the Qualification Pack, review date is scheduled for after 3 years in consultation with Subject Matter Experts. The monitoring of evaluation of assessments and Employer feedback will be sought post-placement, for review of the effectiveness of the Qualification.

Please attach any documents giving further information about any of the topics above.
Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

NSQF QUALIFICATION FILE
Version 6: Draft of 01 September 2016

SECTION 4
EVIDENCE OF PROGRESSION

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?

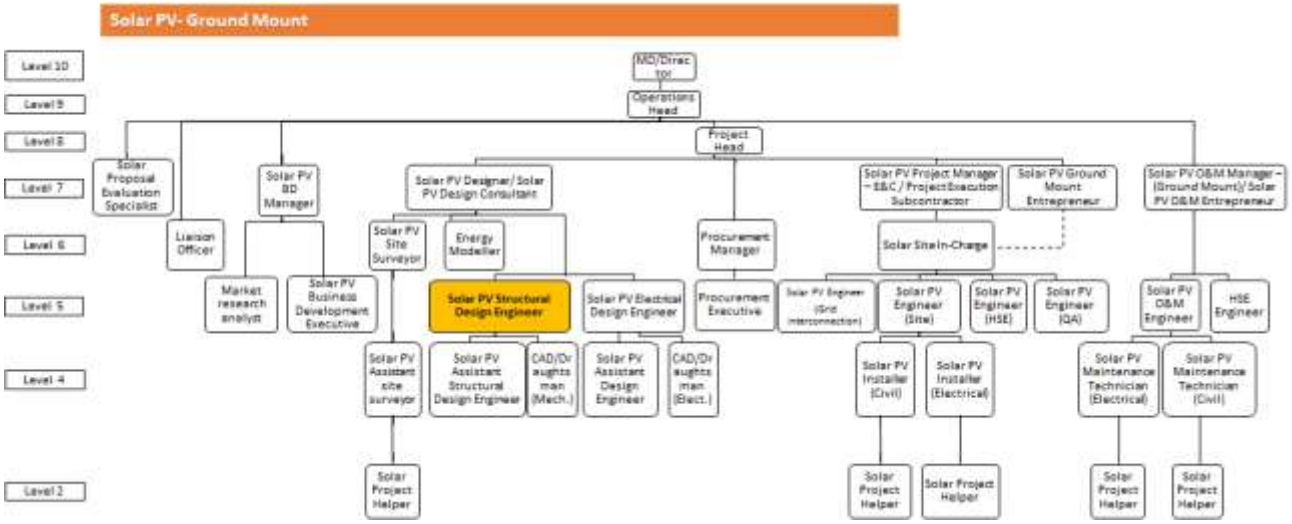
1. Discussing the growth trajectory within each occupation after studying organisational charts of various industry players across small, medium and large scale organizations.
2. Exploring various lateral career opportunities for the discussed qualification
3. Ensuring that there is a clear role up in terms of performance criteria qualification experience and skill requirement from lower NSQF Level to higher levels in the hierarchy.

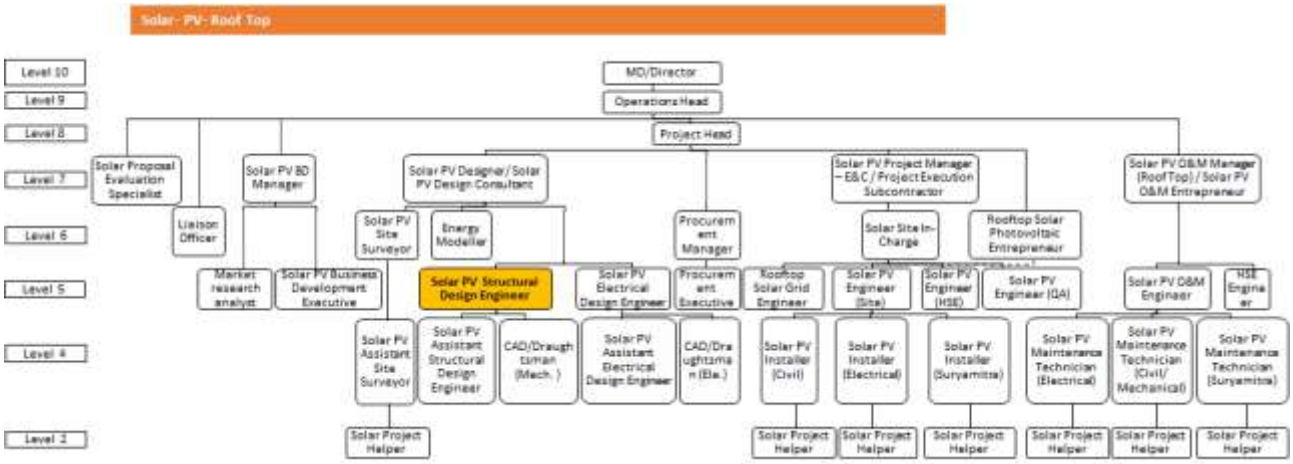
Please refer to attached career path as per annexure 1 which clearly defines the career path.

Please attach any documents giving further information about any of the topics above.
Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

1. Career Map of Solar PV Structural Design Engineer - Annexure 1
2. QP SGJ/ Q0109 - Annexure 2

Annexure 1: Career Map





Annexure 2: QP SGJ/ Q0109