



Route Map

Note: Please use plus and minus buttons on the far left of the spreadsheet to expand and compress sections as required.

Ref	Work Package Title	Milestone	Relevant Marubeni risk assessment report sections (document version v10 only).
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Note: The Fence System Demonstrator commences in parallel with the start of the Feasibility section of the Severn fence activities. The Fence System Demonstrator is however considered to be a critical path item in the conservative overall project plan, and will have been running for a minimum of 1 year before work on the Pre-construction section of the Severn Fence Activities begins.

Severn Fence Activities

Feasibility

1 Project Mobilization		Start Date: Sep-2010 Finish Date: Dec-2010 Contingency (months): 0	
1.1	Fence Selection	SETS Board Select Scheme for further investigation	
1.2	Build / Develop Project Consortium	Consortium Contracts	3.1.1 - Project Mobilisation
1.3	Project Budget Development	Draft Project Budget	1.3.1 - Project scoping and definition
1.4	Project Description of Work (DOW) Development	Finalised DOW	1.3.1 - Project scoping and definition 4.1 - Risk allocation before Porject Concept agreed

2 Project Initiation		Start Date: Nov-2010 Finish Date: Feb-2011 Contingency (months): 2	
2.1	Project Plan Development	Finalised Project Plan	1.3.1 - Project scoping and definition 2.2.3.4 - Secure long-term revenue source
2.2	Health and Safety Plan	Over-arching, whole project health and safety plan. Appointment of lead health and safety officer	
2.3	Project Management Tools	Document Management System (DMS). Systems Engineering Plan agreed	
2.4	Quality Systems	QA Plan	
2.5	Requirements Analysis	Initial system specification agreed	
2.6	Risk Plan	Quantified risk plan	See full document for risk approach baseline

3 Site Investigation		Start Date: Oct-2010 Finish Date: Jan-2012 Contingency (months): 2	
3.1	Bathymetric Data Acquisition	Swath type bathymetry study conducted for likely fence area	1.3.1 - Project scoping and definition 1.3.3 - Construction activities (acquiring and accurate understanding of the construction site prior to commencing work). 2.2.2 - Scoping and project definition
3.2	Geotech Surveys	Geological and Geomorphological Data Acquisition Study. Core samples taken	1.3.1 - Project scoping and definition 1.3.3 - Construction activities (as above) 2.2.2 - Scoping and project definition 3.6.2 - Potential for sedimentation blocking navigation channels
3.3	Onshore site surveys	Onshore topographical site survey	1.3.3 - Construction activities (as above) 2.2.2 - Scoping and project definition
3.4	Navigation Traffic Study	Navigation traffic study undertaken. Study to include all vessel movement. Key stakeholder engagement commenced and reported	2.2.2 - Scoping and project definition 3.6.1 - Impact on shipping including fishing and leisure vessels
3.5	Site Flow Resource Data Acquisition	ADCP Survey Report	1.3.3 - Construction activities (as above) 2.2.2 - Scoping and project definition
3.6	Hydrodynamic Modelling	2.5 D model of the Estuary (Telemac or similar) constructed	1.3.3 - Construction activities (as above) 2.2.2 - Scoping and project definition
3.7	Scoping Environmental Impact Assessment	Scoping EIA undertaken	1.3.6 - Environmental risks
3.8	Scoping Social Impact Assessment	Scoping SIA undertaken	3.2.1.8 Social and Environmental Impact Assessment
3.9	Design Basis	Development of design basis	2.2.2 - Scoping and project definition
3.10	Demonstrator Site Specification	Specification for Severn fence used to inform selection appropriate test site for demonstrator scheme	1.1.1 - Background (see section)
3.11	Severn - Specific Site Selection	Finalised location for fence landfalls, route across estuary and navigation gap location	1.1.1 - Background (see section)

4 Stakeholder Engagement		Start Date: May-2011 Finish Date: Mar-2012 Contingency (months): 1	
4.1	Stakeholder management plan	Stakeholder Management Plan identifying immediate and long-term stakeholder consultation requirements	3.2.1.7 - Stakeholder Consultation
4.2	Key Environmental Stakeholder Engagement	Report on key environmental stakeholder consultations	1.3.6 - Environmental risks
4.3	Key Stakeholder Engagement	Report on key stakeholder consultations	3.2.1.7 - Stakeholder Consultation
4.4	Scoping EIA Adjustments	Major objections and necessary mitigation management plan summarised for full EIA	3.2.1.7 - Stakeholder Consultation

Pre-construction

5 Health and Safety		Start Date: Jun-2016 Finish Date: Nov-2016 Contingency (months): 0	
5.1	Health and Safety Team Appointment	As per WP Title	
5.2	Failure Mode Effect and Criticality Analyses (FMECA)	FMECA Report	
5.4	Fabrication, Assembly and Installation (FAI) Health and Safety Plan	FAI Health and Safety File and associated risk assessments and method statements	
5.5	Operation and Maintenance Health and Safety Plan	O&M Health and Safety File and associated risk assessments and method statements	1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operations and Maintenance (long term contract for maintenance support is required with credible counterparty)

6 Commercial Plan		Start Date: Jun-2016 Finish Date: Dec-2017 Contingency (months): 0	
6.1	Project Budget	Over-arching Project Budget	2.2.3.4 - Secure long-term revenue source
6.2	Financing	Whole scheme finance plan	1.3.2 Pre-Construction activities (Act of Parliament must give equity investors confidence that they are not entering a 'time tunnel') 1.4 - Commercial risk allocation 2.1.5 - Financeability and Insurability 2.2.3.4 - Secure long-term revenue source 3.2.1.4 - Financial impact of planning delays 3.2.2 - Financing
6.2	Insurance	Whole scheme insurance agreed	2.1.5 - Financeability and Insurability 2.1.6 - Proven technology and insurability
6.3	STF Contractual Framework	EPC contract agreed with creditworthy contractor or consortium	1.4 - Commercial risk allocation 2.1.5.1 - EPC Contract 2.1.5.2 - Risk sharing approach
6.4	Development Agreement	Development rights agreement put in place	
6.4	Secure Long-term Revenue Plan	Long-term feed in tariff, power purchase agreement or ROCs system agreed for fence scheme output	2.2.3.4 - Secure long-term revenue source 3.2.1.4 - Financial impact of planning delays 3.2.2 - Financing
6.5	Technology Certification Plan	Equipment Warranty Cover. Plan drawn up to acquire technical and environmental certification of scheme. Demonstrator used to acquire warranty based certificates.	1.3.6 - Environmental risks 2.1.4 - Consolidation of the industry will be required (warranty risk accounted for) 2.1.5.3 Equipment Warranty Cover
6.6	Economics Study	Economics study	2.2.3.4 - Secure long-term revenue source
6.7	Project Budget Review	Finalised Budget	
6.8	Commercial Autonomy	Commercial Plan	1.4 - Commercial risk allocation 2.2.3.4 - Secure long-term revenue source

7 Consenting		Start Date: Jun-2016 Finish Date: Jun-2018 Contingency (months): 4	
7.1	Planning Consent	Concession or long-term contract governing the right to own/lease and operate the project. Consent granted under planning act by Infrastructure Planning Commission	2.2.3.1 - Right to lease/own/operate 2.2.3.2 - Property rights 2.2.3.3 - Rights of access to seabed 3.2.1 - Consenting (see all following 3.2.1.x sections)
7.2	Property Rights	Suitably long freehold lease secured for all works on land. Wayleaves granted for all onshore and offshore works.	2.2.3.1 - Right to lease/own/operate 2.2.3.2 - Property rights 2.2.3.3 - Rights of access to seabed 3.2.1.5 - Wayleaves and consents
7.3	Marine Licence		3.2.1.3 National Marine Policy Statement
7.4	Electricity Planning Acts	Agreements under Section 36, Electricity Act 1989 and under Town and Country Act 1990	2.2.3.1 - Right to lease/own/operate 2.2.3.2 - Property rights 2.2.3.3 - Rights of access to seabed
7.5	Crown Estate	Rights of access to seabed granted by the Crown Estate.	2.2.3.1 - Right to lease/own/operate 2.2.3.2 - Property rights 2.2.3.3 - Rights of access to seabed
7.6	Marine and Coastal Access Bill		
7.7	Environmental Consents		1.3.6 - Environmental risks
7.8	Environmental Monitoring Plan	Environmental Monitoring Plan	1.3.6 - Environmental risks
7.9	Shipping and navigation		3.6.1 - Impact on shipping including fishing and leisure vessels

8 Scheme Design		Start Date: Jun-2016 Finish Date: Jun-2018 Contingency (months): 3	
8.1	Hydrodynamic Modelling Work - Loop 1	2.5D CFD Model	1.3.1 - Project scoping and definition 3.1.2 - Updated project output modelling
8.2	TEC Device Concept Validation TEC Device Specification - Loop 1	Concept validation TEC Machine Specification Document. Design basis reviewed and revised as necessary	Specification assumes that the hydrodynamic model accurately models the scheme's modification of the flow regime. The successive iterations of the hydrodynamic model and TEC design are aimed at managing and addressing this uncertainty.
8.3	Control Design (TEC and Scheme) - Loop 1	Draft TEC Device and Scheme Control methodology (di-urnal, lunar and annual plans)	
8.4	Electrical Works Design - Loop 1	Draft Electrical Specification	
8.5	Civil Works Design - Loop 1	Draft Civil Works Specification	
8.6	Hydrodynamic Modelling - Loop 2	2.5D CFD Model	1.3.1 - Project scoping and definition 3.1.2 - Updated project output modelling
8.7	Preliminary Design TEC Device Specification - Loop 2	Preliminary TEC Device Specification Document	
8.8	Control design (TEC and Scheme) - Loop 2	TEC Device and Scheme Control methodology (di-urnal, lunar and annual plans)	
8.9	Electrical Works Design - Loop 2	Electrical Specification	

8.10	Civil Works Design - Loop 2	Civil Works Specification	
8.11	Hydrodynamic Modelling - Loop 3	2.5D CFD Model	1.3.1 - Project scoping and definition 3.1.2 - Updated project output modelling
8.12	Detailed Design TEC Device Specification - Loop 3	Preliminary TEC Device Specification Document	
8.13	Control design (TEC and Scheme) - Loop 3	TEC Device and Scheme Control methodology (di-urnal, lunar and annual plans)	
8.14	Electrical Works Design - Loop 3	Electrical Specification	
8.15	Civil Works Design - Loop 3	Civil Works Specification	
8.16	Grid Capacity Study	Study assessing the capacity of the existing grid in comparison to that required for the fence scheme	1.3.4 - Gridworks 3.2.1.6 - Window for grid connection
8.17	Grid Capacity Reinforcement Design	Design of grid reinforcement works to match existing capacity to required capacity	1.3.4 - Gridworks
8.18	Fabrication, Assembly and Installation (FAI) Plan	Installation plan to explain staged installation and power production of the scheme	
8.19	Operation and Maintenance Plan	Operation and Maintenance Manual	1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operators and Maintenance (long term contract for maintenance support is required with credible counterparty) 3.5.1 - Mobilisation phase - Risk of developers having sufficient personnel for training of STF operators
8.20	Supply Chain Study	Supply Chain Study	3.3.2.2 Risk of delay and cost increase due to supply chain problems
8.21	Support Vessel Study	Support Vessel Study	3.3.2.2 Risk of delay and cost increase due to supply chain problems
8.22	Scheme Design Summary	Scheme Design Agreed	

9 Stakeholder Consultation		Start Date: Jan-2017 Finish Date: Dec-2018 Contingency (months): 0	
9.1	Stakeholder Management Plan Review	Review of Stakeholder Management Plan generate in 4.1	1.3.2 - Pre-Construction activities (ensuring transparency for stakeholders during planning process) 3.2.1.7 - Stakeholder Consultation
9.2	National Government	Notice to Proceed	2.2.3.4 - Secure long-term revenue source
9.3	Local Government	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.4	Local Chamber of Commerce	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.5	Local Transport Operators	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.6	Local Port Authorities	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.7	Maritime Governing Bodies	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.8	Crown Estate	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.9	Marine and Coastguards Association (MCA)	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.10	National Association of Fishing and Fisheries (NAFF – check)	Stakeholder Consultation Report	3.6.1 - Impact on shipping including fishing and leisure vessels 3.6.5 - Migratory Fish 3.2.1.7 - Stakeholder Consultation
9.11	Investors	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.12	Marine Energy Industry	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.13	TEC Device Developers	Stakeholder Consultation Report	2.2.1 - Low flow speed testing and power resource estimation (see section) 3.2.1.7 - Stakeholder Consultation 3.3.2.1 Risk of delay due to manufacturers not reaching critical mass
9.14	Marine Installation Contractors	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.15	Offshore Wind Turbine industry	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.16	Regulatory Bodies (safety)	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.17	Regulatory Bodies (certification)	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.18	Utility Companies	Stakeholder Consultation Report	2.2.3.4 - Secure long-term revenue source
9.19	Distribution Network Operators	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.20	National Grid	Stakeholder Consultation Report	1.3.4 - Gridworks
9.21	Leisure Users Groups	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
9.22	Other Groups (as identified in 7.1)	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation

10 Environmental Consultation		Start Date: Jan-2017 Finish Date: Dec-2018 Contingency (months): 0	
10.1	Environmental Stakeholder Management Plan	Environmental Stakeholder Management Plan document explaining consultation processes to be undertaken. This may need to be undertaken through engagement of an independent consultant body such as the Environment Council	1.3.6 - Environmental risks 3.2.1.7 - Stakeholder Consultation
10.2	Environmental Groups	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.2.1.7 - Stakeholder Consultation
10.3	Fish Groups	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.6.5 - Migratory Fish 3.2.1.7 - Stakeholder Consultation
10.4	Bird Groups	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.2.1.7 - Stakeholder Consultation
10.5	Cetacean Groups	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.2.1.7 - Stakeholder Consultation
10.6	Flora Groups	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.2.1.7 - Stakeholder Consultation
10.7	Geology	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.2.1.7 - Stakeholder Consultation
10.8	Geomorphology	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.6.2 - Potential for sedimentation blocking navigation channels 3.2.1.7 - Stakeholder Consultation
10.9	Other Groups (as identified in 8.1)	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks 3.2.1.7 - Stakeholder Consultation
10.10	Full EIA Report	Full EIA Report issued	

Construction

11 Construction Health and Safety		Start Date: Oct-2018 Finish Date: May-2019 Contingency (months): 0	
11.1	Health and Safety Plans Review		
11.2	Construction Design Management (CDM)		

11 Contracting and Procurement		Start Date: Nov-2018 Finish Date: Nov-2019 Contingency (months): 12	
11.1	Procurement Plan	Procurement Plan	3.3.2 - Procurement
11.2	TEC Device Developer(s) Selection	Selection of developer(s) to supply technology in accordance with demonstrator project, sufficient manufacturing capacity / partner manufacturer and detailed design specification	2.1.4 - Consolidation of the industry will be required (ensuring manufacturing capacity aligns with project development) 2.2.1 - Low flow speed testing and power resource estimation (see section) 3.3.1 - Contract Negotiation 3.3.2.1 Risk of delay due to manufacturers not reaching critical mass
11.3	Marine Installation Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
11.4	Grid Works Contract	Appointed Contractor	1.3.4 - Gridworks 3.3.1 - Contract Negotiation
11.5	Electrical Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
11.6	Scheme Communications Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
11.7	Civil Works Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
11.8	Operation and Maintenance Contractor	Appointed Contractor	1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operations and Maintenance (long term contract for maintenance support is required with credible counterparty) 3.3.1 - Contract Negotiation 3.5.1 - Mobilisation phase - Risk of developers having sufficient personnel for training of STF operators
11.9	Emergency Response Contract	Appointed Contractor	3.3.1 - Contract Negotiation
11.10	Marine Operations Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
11.11	Manufacturing Contractors	Appointed Contractor	3.3.1 - Contract Negotiation
11.12	Materials Procurement	Procurement of all materials and parts required.	3.3.2 - Procurement 3.3.1 - Contract Negotiation 3.3.2.3 - Risk of cost overrun for rising prices of raw materials

12 Phased Scheme Fabrication, Assembly and Installation		Start Date: Jan-2019 Finish Date: Nov-2021 Contingency (months): 18	
12.1	Site Preparation	Site Preparation	1.3.3 - Construction activities (see whole section) 3.3.3 - Site preparation
12.2	Site Infrastructure Construction	Site Infrastructure Construction	3.3.3 - Site Preparation 3.3.4 - Infrastructure construction / fabrication
12.3	Grid Reinforcement Works	Grid ready for construction and phased operation / output	1.3.4 - Gridworks
12.4	Construction of civil works - Phase 1	Inner row to first and second substation	3.3.5 - Installation and commissioning on phased basis
12.5	Construction of electrical and communication systems - Phase 1		
12.6	Installation of TEC Devices - Phase 1		
12.7	TEC Commissioning - Phase 1		3.3.5 - Installation and commissioning on phased basis
12.8	Scheme Phase Commissioning - Phase 1	Phase 1 Commissioning Certificates	
12.9	Construction of civil works - Phase 2	Inner row to third and fourth substation	3.3.5 - Installation and commissioning on phased basis
12.10	Construction of electrical and communication systems - Phase 2		
12.11	Installation of TEC Devices - Phase 2		
12.12	TEC Commissioning - Phase 2		3.3.5 - Installation and commissioning on phased basis
12.13	Scheme Phase Commissioning - Phase 2	Phase 2 Commissioning Certificates	
12.14	Construction of civil works - Phase 3	Outer row to first and second substation	3.3.5 - Installation and commissioning on phased basis
12.15	Construction of electrical and communication systems - Phase 3		
12.16	Installation of TEC Devices - Phase 3		
12.17	TEC Commissioning - Phase 3		3.3.5 - Installation and commissioning on phased basis
12.18	Scheme Phase Commissioning - Phase 3	Phase 3 Commissioning Certificates	
12.19	Construction of civil works - Phase 4	Outer row to third and fourth substation	3.3.5 - Installation and commissioning on phased basis
12.20	Construction of electrical and communication systems - Phase 4		
12.21	Installation of TEC Devices - Phase 4		
12.22	TEC Commissioning - Phase 4		3.3.5 - Installation and commissioning on phased basis
12.23	Scheme Phase Commissioning - Phase 4	Full System Commissioning Certificates	3.3.5 - Installation and commissioning on phased basis

Operation

13 Scheme Operation and Maintenance		Start Date: Sep-2020 Finish Date: Mar-2022 Contingency (months): 0	
13.1	Operation and Maintenance Management Team	Appointment of scheme management and operation and maintenance contracts	1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operations and Maintenance (long term contract for maintenance support is required with credible counterparty) 3.3.1 - Contract Negotiation 3.5.1 - Mobilisation phase - Risk of developers having sufficient personnel for training of STF operators
13.2	Scheme Control Optimisation Plan	Plan to ensure that energy capture plan and environmental impact are constantly monitored and adjusted to optimise the scheme for both	1.3.6 - Environmental risks 3.4.1 - Risk of availability of balancing power and / or suitable energy storage to mitigate peaks and troughs of generation

13.3	Scheme Future Development	Second generation TEC Device replacement plan	2.2.3.4 - Secure long-term revenue source
13.4	Scheme Handover to Operation and Management Team		2.1.5.4 Operatons and Maintenance (long term contract for maintenance support is required with credibleworthy counterparty) 3.5.1 - Mobilisation phase - Risk of developers having sufficient personnel for training of STF operators 3.5.2 - Handover to O + M team

Note: The fence system demonstrator will be used to achieve project certification, an important milestone for attaining acquisition of project finance for the

Fence System Demonstrator

14 Site Identification		Start Date: Oct-2010 Finish Date: Mar-2011 Contingency (months): 2	
14.1	Demonstrator Site Specification	Demonstrator Site Specification	
14.2	Bathymetric Data Acquisition	Swath type bathymetry study conducted for likely fence area	1.3.1 - Project scoping and definition 1.3.3 - Construction activities (acquiring and accurate understanding of the construction site prior to commencing work).
14.3	Geotech Surveys	Geological and Geomorphological Data Acquisition Study. Core samples taken	1.3.1 - Project scoping and definition 1.3.3 - Construction activities (as above)
14.4	Onshore site surveys	Onshore topographical site survey	1.3.3 - Construction activities (as above)
14.5	Navigation Traffic Study	Navigation traffic study undertaken. Study to include all vessel movement. Key stakeholder engagement commenced and reported	3.2.1.7 - Stakeholder Consultation 3.6.1 - Impact on shipping including fishing and leisure vessels
14.6	Site Flow Resource Data Acquisition	ADCP Survey Report	2.2.1 - Low flow speed testing and power resource estimation
14.7	Hydrodynamic Modelling	2.5 D model of the Estuary (Telemac or similar) constructed	3.1.2 - Updated project output modelling 2.2.1 - Low flow speed testing and power resource estimation
14.8	Scoping Environmental Impact Assessment	Scoping EIA undertaken	1.3.6 - Environmental risks
14.9	Scoping Social Impact Assessment	Scoping SIA undertaken	3.2.1.8 Social and Environmental Impact Assessment
14.10	Environmental Stakeholder Engagement	Environmental Stakeholder Consultation Report	1.3.6 - Environmental risks
14.11	Stakeholder Engagement	Stakeholder Consultation Report	3.2.1.7 - Stakeholder Consultation
14.12	Environmental Monitoring Plan	Environmental Monitoring Plan	1.3.6 - Environmental risks
14.13	Design Basis	Design Basis Report	
14.14	Demonstrator Site Selection	As per WP Title	

15 Technical Feasibility and Design		Start Date: Mar-2011 Finish Date: Mar-2012 Contingency (months): 6	
15.1	Scheme Design Plan		2.1.1 - Technology (scheme designed to assist the tidal stream technology market to come to fruition) 2.1.2 - Kick-starting the industry 2.1.3 - Development of a critical mass of commercial scale generators 4.1.1 - Intermediate steps - STF - specific
15.2	Hydrodynamic Modelling Work - Loop 1	2.5D CFD Model	1.3.1 - Project scoping and definition 3.1.2 - Updated project output modelling
15.3	TEC Device Concept Validation TEC Device Specification - Loop 1	Preliminary TEC Device Specification Document	
15.4	Control Design (TEC and Scheme) - Loop 1	TEC Device and Scheme Control methodology (di-urnal, lunar and annual plans)	
15.5	Electrical Works Design - Loop 1	Electrical Specification	
15.6	Civil Works Design - Loop 1	Civil Works Specification	
15.7	Technical Feasibility Report	As per WP Title	

16 Pre-Construction and Consenting		Start Date: Mar-2012 Finish Date: Mar-2013 Contingency (months): 8	
16.1	Over-arching Health and Safety Plan	As per WP Title	
16.2	Development Agreement	Development rights agreement put in place	
16.3	Failure Mode Effect and Criticality Analyses (FMECA)	FMECA Report	
16.4	Fabrication, Assembly and Installation (FAI) Health and Safety Plan	CAI Health and Safety File and associated risk assessments and method statements	
16.5	Operation and Maintenance Health and Safety Plan	O&M Health and Safety File and associated risk assessments and method statements	1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operatons and Maintenance (long term contract for maintenance support is required with credibleworthy counterparty)
16.6	Commercial Plan		1.4 - Commercial risk allocation
16.7	Project Budget	Over-arching Project Budget	
16.8	Financing	Whole scheme finance plan	2.1.5.3 Equipment Warranty Cover 3.2.2 - Financing
16.9	Insurance	Whole scheme insurance agreed	2.1.5 - Financeability and Insruability 2.1.5.3 Equipment Warranty Cover
16.10	Technology and Project Certification Plan		2.1.5.3 Equipment Warranty Cover
16.11	Planning Consent	Consent granted under planning act by Infrastructure Planning Commission (IPC)	2.2.3.1 - Right to lease/own/operate 2.2.3.2 - Property rights 2.2.3.3 - Rights of access to seabed 3.2.1 - Consenting
16.12	Property Rights		2.2.3.1 - Right to lease/own/operate 2.2.3.2 - Property rights 2.2.3.3 - Rights of access to seabed
16.13	Electricity Planning Act		3.2.1.3 - National Marine Policy Statement
16.14	Crown Estate Engagement		2.2.3.1 - Right to lease/own/operate 2.2.3.2 - Property rights 2.2.3.3 - Rights of access to seabed

16.15	Marine and Coastal Access Bill		2.2.3.3 - Rights of access to seabed 3.2.1.3 - National Marine Policy Statement
16.16	Hydrodynamic Modelling Work - Loop 2	Updated 2.5D CFD Model	1.3.1 - Project scoping and definition
16.17	Preliminary Design TEC Device Specification - Loop 2	Preliminary TEC Device Specification Document	
16.18	Control design (TEC and Scheme) - Loop 2	TEC Device and Scheme Control methodology (di-urnal, lunar and annual plans)	
16.19	Electrical Works Design - Loop 2	Electrical Specification	
16.20	Civil Works Design - Loop 2	Civil Works Specification	
16.21	Grid Capacity Study	As per WP Title	3.4 - Gridworks
16.22	Grid Capacity Reinforcement Design	As per WP Title	3.4 - Gridworks
16.23	Fabrication, Assembly and Installation (FAI) Plan	As per WP Title	
16.24	Operation and Maintenance Plan	As per WP Title	1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operatons and Maintenance (long term contract for maintenance support is required with crediworthy counterparty)
16.25	Supply Chain Study	As per WP Title	3.3.2.2 Risk of delay and cost increase due to supply chain problems
16.26	Support Vessel Study	As per WP Title	3.3.2.2 Risk of delay and cost increase due to supply chain problems
16.27	Scheme Design Summary	As per WP Title	

17 Construction		Start Date: Mar-2013 Finish Date: Jun-2014 Contingency (months): 12	
17.1	Health and Safety Plans Review	As per WP Title	
17.2	Construction Design Management (CDM)		
17.3	Procurement Plan	Procurement Plan	3.3.2 - Procurement
17.4	TEC Device Developer(s) Selection	Selection of developer(s) to supply technology in accordance with demonstrator project, sufficient manufacturing capacity / partner manufacturere and detailed design specification	2.1.4 - Consolidation of the industry will be required (ensuring manufacturing capacity aligns with project development) 2.2.1 - Low flow speed testing and power resource estimation (see section) 3.3.1 - Contract Negotiation 3.3.2.1 Risk of delay due to manufacturers not reaching critical mass
17.5	Marine Installation Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
17.6	Grid Works Contract	Appointed Contractor	3.3.1 - Contract Negotiation
17.7	Electrical Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
17.8	Scheme Communications Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
17.9	Civil Works Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
17.10	Operation and Maintenance Contractor	Appointed Contractor	1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operatons and Maintenance (long term contract for maintenance support is required with crediworthy counterparty) 3.3.1 - Contract Negotiation
17.11	Emergency Response Contract	Appointed Contractor	3.3.1 - Contract Negotiation
17.12	Marine Operations Contractor	Appointed Contractor	3.3.1 - Contract Negotiation
17.13	Manufacturing Contractors	Appointed Contractor	3.3.1 - Contract Negotiation
17.14	Materials Procurement	Procurement of all materials and parts required.	3.3.1 - Contract Negotiation 3.3.2 - Procurement 3.3.2.3 - Risk of cost overrun for rising prices of raw materials
17.15	Site Preparation		3.3.3 - Site Preparation
17.16	Site Infrastructure Construction		3.3.3 - Site Preparation 3.3.4 - Infrastructure construction / fabrication
17.17	Grid Reinforcement Works		
17.18	Construction of civil works		
17.19	Construction of electrical and communication systems		
17.20	Installation of TEC Devices		
17.21	TEC Commissioning	TEC Commissioning Certificates	
17.22	Scheme Commissioning	Project Commissioning Certificates	

18 Operation and Testing		Start Date: Jun-2014 Finish Date: Oct-2016 Contingency (months): 6	
18.1	Scheme Testing Plan	As per WP Title	2.1.6 - Proven technology and insurability (before the commercial insurance market will provide mechanical breakdown cover, the underlying tidal stream technology needs to have been operating for around 12 months) 2.2.1 - Low flow speed testing and power resource estimation (see section)
18.2	Scheme Control Optimisation Plan	As per WP Title	2.1.6 - Proven technology and insurability (as above) 2.2.1 - Low flow speed testing and power resource estimation (see section)
18.3	Scheme Operation and Maintenance Plan		1.3.5 - Operational risks / insufficient track record of operation 2.1.5.4 Operatons and Maintenance (long term contract for maintenance support is required with crediworthy counterparty) 3.5.1 - Mobilisation phase - Risk of developers having sufficient personnel for training of STF operators