

# ADSS Line Design & Challenges

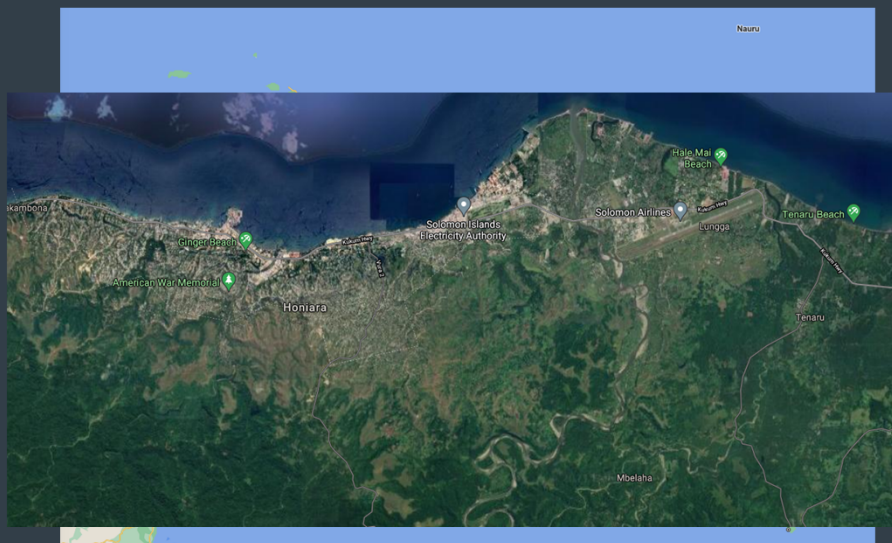
James Donald

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## Project Background






Google Maps 23.04.2021


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## Project Background











LUNGGA POWER STATION



LONG SPAN



HENDERSON SOLAR FARM

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## ADSS (All Dielectric Self Supporting)

### SM@RTSPAN® ADSS

All Dielectric Self-supported

**Cable Design**



- Drawing not to scale -


This all dielectric loose tube aerial optical cable spans between poles (maximum 150 metres).

Technical data	
Number of Fibres	
Number of elements	
Tube / Filler diameter	mm
Cable nominal diameter	mm
Tolerance	mm
Cable nominal weight	kg/km
Modulus of elasticity @ 20°C	kN/mm <sup>2</sup>
Theoretical effective area	mm <sup>2</sup>
Thermal expansion coeff. @ 20°C	1/°C
Calculated break load	kN
Max. everyday tension	kN
Max. working tension at: 33m/hr wind & 5mm radial ice	kN
Min. installation sag	%
Max. crush resistance	kN/100mm
Min. bending radius	mm
Temperature range	°C

Main ADSS Cable used

### External Underground Loosetu

**Cable Design**



- Drawing not to scale -

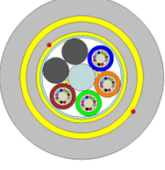
This loose tube dielectric optical cable is designed for external underground floating techniques or by direct burial in open-cut trenches.

Technical data	
Number of Fibres	<b>2 to 72</b>
Number of elements	6 x 12
Tube / Filler diameter	mm
Cable nominal diameter	mm
Cable nominal weight	kg/km
Max. installation tension	kN
Max. crush resistance	kN/100mm
Min. bending radius	mm
Temperature range	°C

ADSS Underground Cable

### ADSS Cable used for River Crossing

**Cable Design** IEEE 1222 / IEC/EN 60794-3-20



- not to scale -

- **Central strength member (CSM):** glass fibre reinforced plastic material (FRP).
- **Tube:** thermoplastic material, containing 12 optical fibres and filled with a suitable water tightness compound.
- **Stranding:** the required number of elements (tubes or fillers) are 52 stranded around the central strength member.
- **Core Wrapping:** water blocking tape (dry core).
- **Inner Sheath:** PE. 1 ripcord beneath.
- **Peripheral reinforcement:** aramid yarns.
- **Outer Sheath:** Anti-tracking PE. 1 ripcord beneath.

Technical data	
No. of Fibres	<b>48</b>
Design(element x fibre per tube)	6x12
Loose Tube / Filler - Ø nominal	mm
CSN/coating nominal diameter	mm
Inner sheath nominal thickness	mm
Outer sheath nominal thickness	mm
Cable nominal Diameter	mm
Cable Weight	kg / km
Maximum Span	m
Minimum Sag	%
Maximum installation tension	kN
Max. Operating tension (MAT)	kN
thermal expansion coefficient(20°C)	1/°C
elasticity modulus(20°C)	kg/mm <sup>2</sup>
Maximum installation condition	Temperature: -1°C; Maximum wind:150.7 km/h; Ice thickness:0mm
Min. bending radius	mm
Temperature range	°C

ADSS Cable used for River Crossing

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## Existing Line

### Physical and Mechanical Performance Data

Conductor codename	Stranding and wire diameter no/mm		Nominal overall diameter mm	Cross-sectional area mm <sup>2</sup>	Approximate mass kg/km	Breaking load kN	Modulus of elasticity GPa	Coefficient of linear expansion $\times 10^{-6}/^{\circ}\text{C}$	Product code
	Aluminium	Steel							
Banana	6/3.75	1/3.75	11.3	77.3	268	22.7	83	19.3	Banana
Cherry	6/4.75	7/1.60	14.3	120	402	33.4	80	19.9	Cherry



Existing Double Circuit Line



Existing Single Circuit Line

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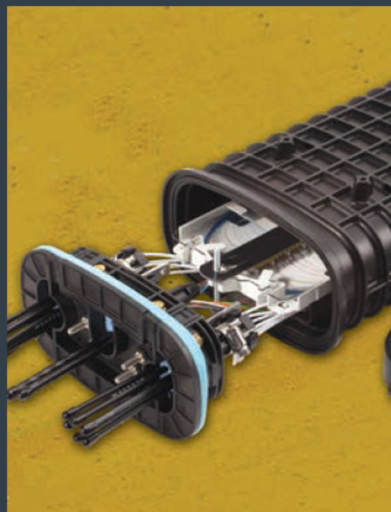
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## ADSS Hardware



Suspension Clamp



Splice Box



Tension Assembly

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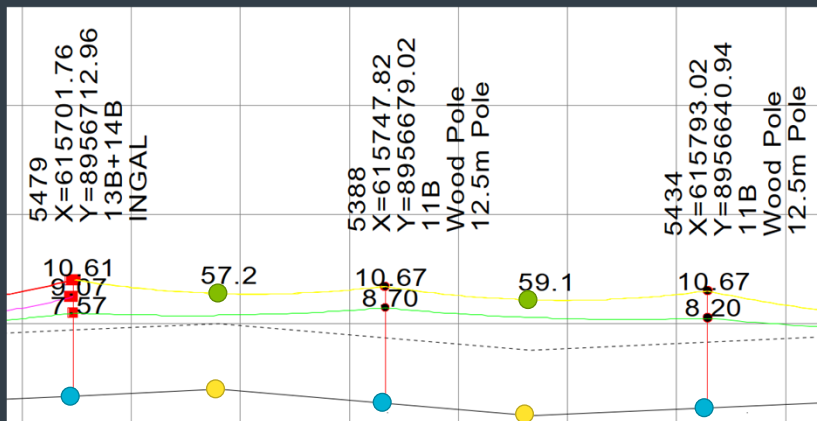
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## Design Challenges

Limited As Built & Survey data

- Structure base point
- Mid span ground point
- Mid span belly point

11kV 70°C  
ADSS 40°C  
Ground Clearance Line 6.0m



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## Design Challenges

Ground Clearance

- Area prone to flood risk, cannot underground, thus Solomon Power prefer intermediate poles to remedy ground clearance violations.



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### Observations



Approved TMP?  
(Traffic Management Plan)

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### Observations



Unearthed UXO at Henderson Solar  
Farm Site (2015)

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Observations



Upstand for Steel pole with steel casing supplied by Mobil?

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End.

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