

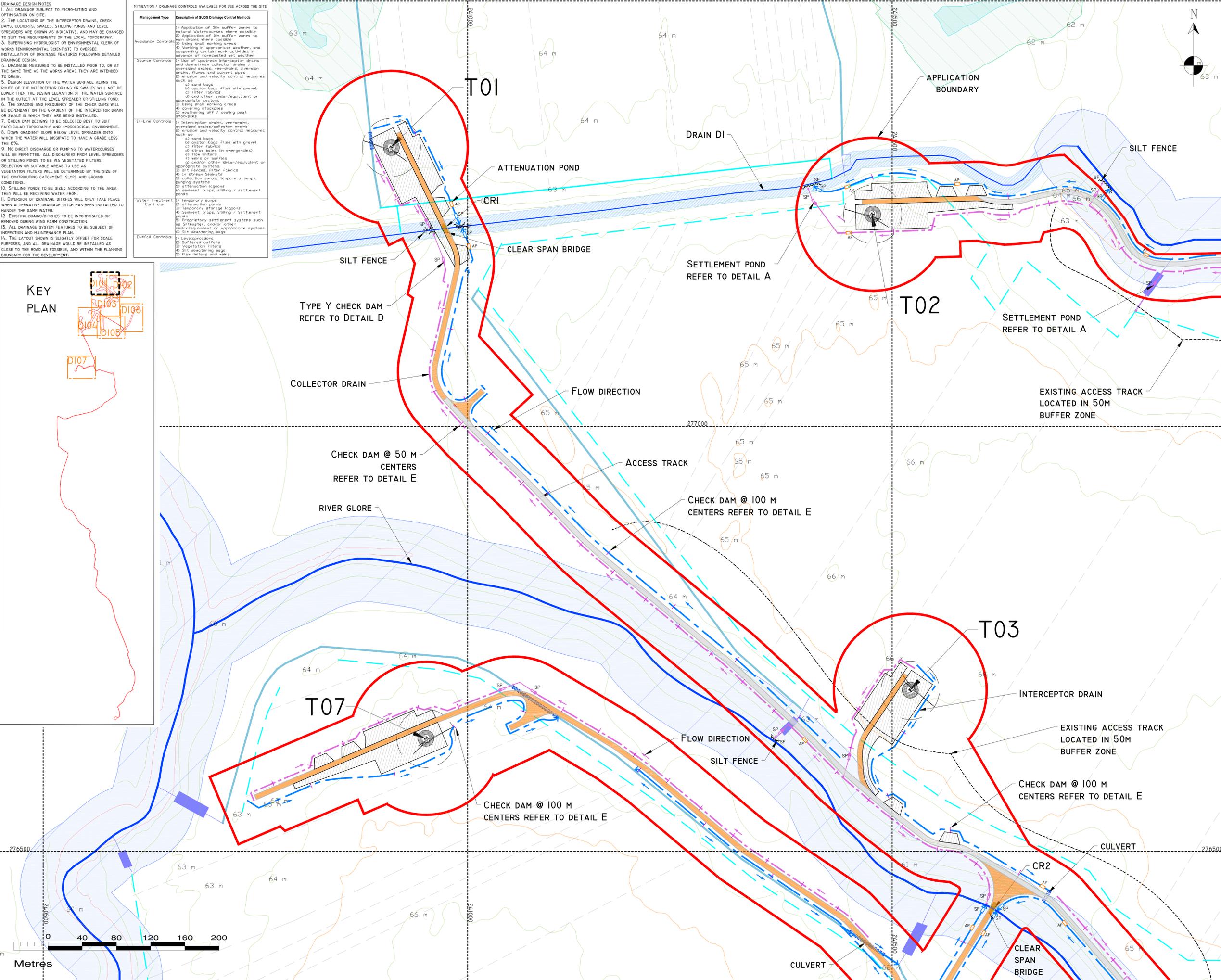
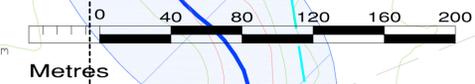
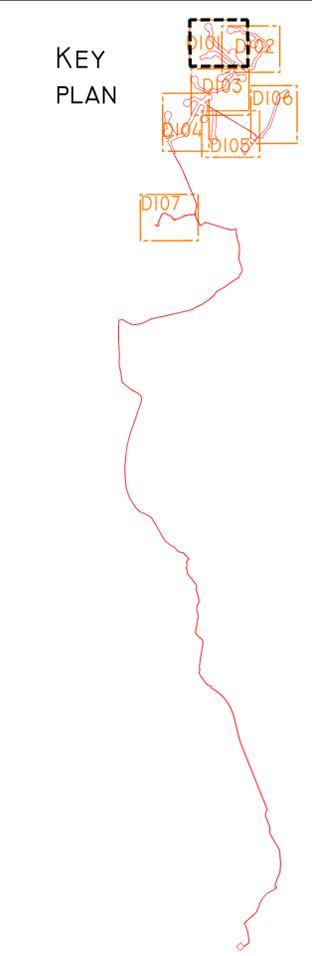


APPENDIX 4-9

DRAINAGE DRAWINGS

DRAINAGE DESIGN NOTES

1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMIZATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, STILLING PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THAN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR STILLING POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISAPATE TO HAVE A GRADE LESS THE 6%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OR SUITABLE AREAS TO USE AS VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
10. STILLING PONDS TO BE SIZED ACCORDING TO THE AREA THEY WILL BE RECEIVING WATER FROM.
11. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
12. EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
13. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
14. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WOULD BE INSTALLED AS CLOSE TO THE ROAD AS POSSIBLE, AND WITHIN THE PLANNING BOUNDARY FOR THE DEVELOPMENT.



- DRAWING LEGEND :**
- UPSTREAM INTERCEPTOR DITCHES
 - DIRECTION OF FLOW
 - DOWNSTREAM COLLECTOR DITCHES
 - SETTLEMENT POND (SP)
 - ATTENUATION POND (AP)
 - CULVERT
 - SILT FENCE (SF)
 - HEADLAND DRAIN
 - FIELD DRAIN
 - CR - NEW STREAM/RIVER CROSSING LOCATION
 - CLEAR SPAN BRIDGE
 - EXISTING SETTLEMENT POND

- APPLICATION BOUNDARY
- EXISTING GROUND SURFACE MAJOR CONTOUR (5 M INTERVAL)
- EXISTING GROUND SURFACE MINOR CONTOUR (1 M INTERVAL)
- RIVERS/STREAMS
- LAKES
- NATURAL RIVERS/STREAMS 50M BUFFER
- DRAIN 10M BUFFER
- LAKE 50M BUFFER
- TURBINE AND SWEEP AREA
- TURBINE FOUNDATION
- REGIONAL ROAD
- LOCAL ROAD
- PROPOSED ROAD
- EXISTING ROAD TO BE UPGRADED
- PASSING BAY
- CRANE PLATFORM
- BORROW PIT

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5. ALL CONTRACTORS, WEATHER MAIN OR SUB-CONTRACTORS, MUST VISIT THE SITE AND ARE RESPONSIBLE FOR TAKING AND CHECKING ANY AND ALL DIMENSIONS AND LEVELS THAT RELATE TO THE WORKS.
6. THE USE OF OR RELIANCE UPON THIS DRAWING SHALL BE DEEMED TO BE ACCEPTANCE OF THESE CONDITIONS OF USE UNLESS OTHERWISE AGREED IN WRITING, SUCH WRITTEN AGREEMENT TO BE SOUGHT FROM AND ISSUED BY THE COPYRIGHT HOLDER TO THE USE OR RELIANCE UPON THIS DRAWING.
7. LAYOUT PLANS SHOW TYPICAL TURBINE ROTOR DIAMETER AS PER TURBINE DRAWING.

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Date	Description	Chkd	Signed
Revisions			

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Client: **MKO**

Job: **COOLE WF, CO. WESTMEATH**

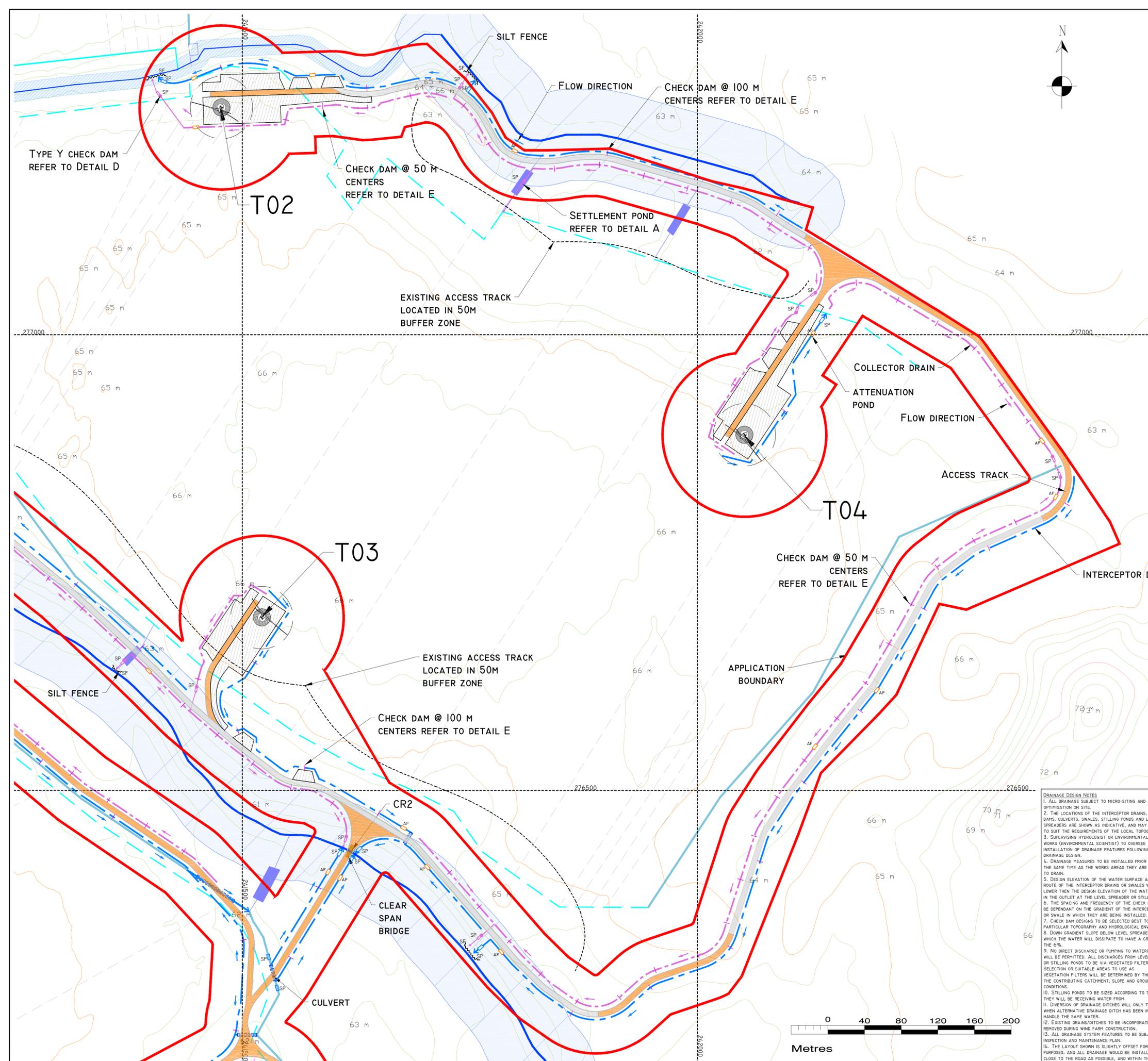
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Figure No: **D101**

Drawing No: P1320-2-0221-A1-D101-00A

Sheet Size: A1 Project No.: P1320-2

Scale: 1:2,000 (A1) Drawn By: MG/GD
Date: 17/02/2021 Checked By: MG



DRAWING LEGEND :

- UPSTREAM INTERCEPTOR DITCHES
- DIRECTION OF FLOW
- DOWNSTREAM COLLECTOR DITCHES
- SETTLEMENT POND (SP)
- ATTENUATION POND (AP)
- CULVERT
- SILT FENCE (SF)
- HEADLAND DRAIN
- FIELD DRAIN
- CR - NEW STREAM/RIVER
- CROSSING LOCATION
- CLEAR SPAN BRIDGE
- EXISTING SETTLEMENT POND

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- LAYOUT PLANS SHOW TYPICAL TURBINE ROTOR DIAMETER AS PER TURBINE DRAWING.

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Date	Description	Chkd	Signed
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Client: **MKO**

Job: **COOLE WF, CO. WESTMEATH**

Title: **DRAINAGE LAYOUT SHEET 2 OF 7**

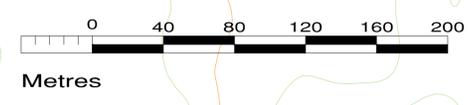
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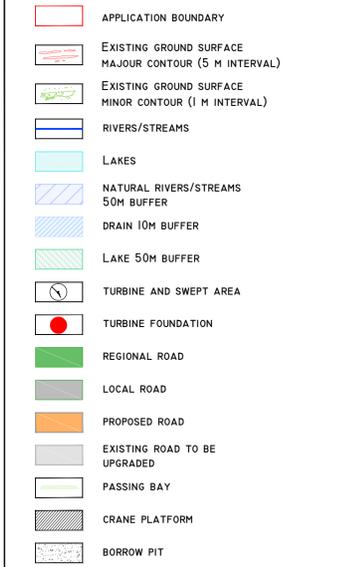
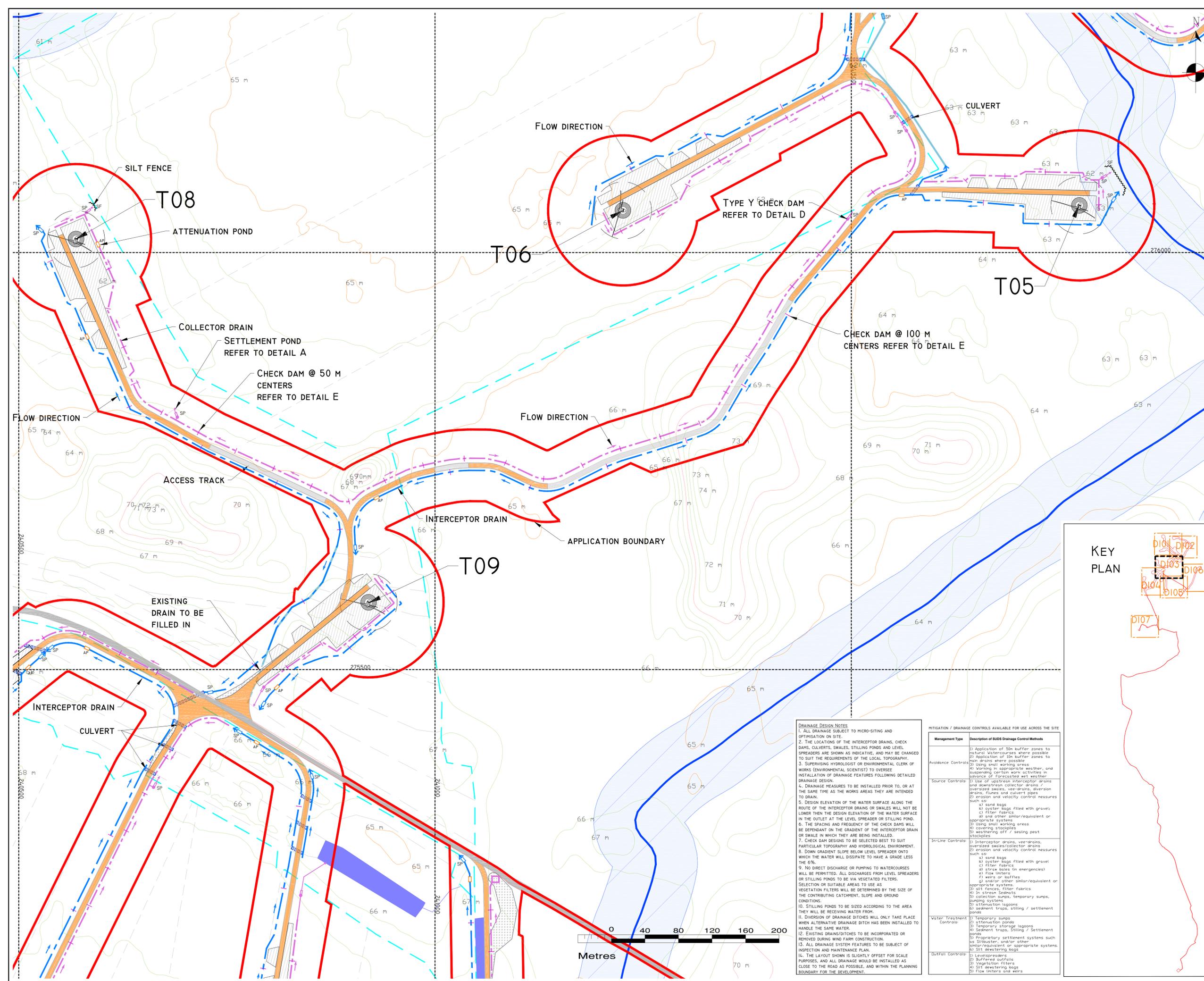
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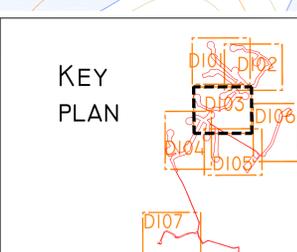
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PROJECT DESIGN DRAWING NOTES

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- LAYOUT PLANS SHOW TYPICAL TURBINE ROTOR DIAMETER AS PER TURBINE DRAWING.

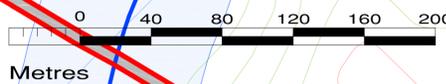


DRAINAGE DESIGN NOTES

- ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMIZATION ON SITE.
- THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, STILLING PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
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- DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THAN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR STILLING POND.
- THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
- CHECK DAM DESIGN TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
- DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISSIPATE TO HAVE A GRADE LESS THAN 6%.
- NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OF SUITABLE AREAS TO USE AS VEGETATED FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
- STILLING PONDS TO BE SIZED ACCORDING TO THE AREA THEY WILL BE RECEIVING WATER FROM.
- DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN AN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
- EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
- ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
- THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WOULD BE INSTALLED AS CLOSE TO THE ROAD AS POSSIBLE, AND WITHIN THE PLANNING BOUNDARY FOR THE DEVELOPMENT.

MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	<ul style="list-style-type: none"> 1) Application of 50m buffer zones to natural watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls	<ul style="list-style-type: none"> 1) Use of upstream intercepter drains and downstream collector drains 2) oversized silters, veer-drains, diversion drains, flumes and culvert pipes 3) erosion and velocity control measures such as: <ul style="list-style-type: none"> a) sand bags b) silt bags filled with gravel c) filter fabrics d) other similar/equivalent or appropriate systems 4) using small working areas 5) covering stockpiles 6) weathering off / sealing peat stockpiles
In-Line Controls	<ul style="list-style-type: none"> 1) Interceptor drains, veer-drains, oversized silters/collector drains 2) erosion and velocity control measures such as: <ul style="list-style-type: none"> a) sand bags b) silt bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) flow diverters f) weirs or half-flumes g) and/or other similar/equivalent or appropriate systems 3) silt fences, filter fabrics 4) in stream silttraps 5) collection sumps, temporary sumps, pumping systems 6) attenuation lagoons 7) sediment traps, stiling / settlement ponds
Water Treatment Controls	<ul style="list-style-type: none"> 1) Temporary sumps 2) Temporary storage lagoons 3) Sediment traps, Stiling / settlement ponds 4) Proprietary settlement systems such as siltmaster, and/or other similar/equivalent or appropriate systems 5) Silt de-watering lagoons
Outfall Controls	<ul style="list-style-type: none"> 1) Level spreaders 2) Buffers/outfalls 3) Vegetation filters 4) Silt diverting bags 5) Flow diverters and weirs

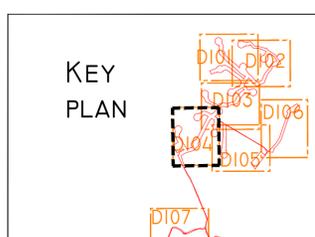
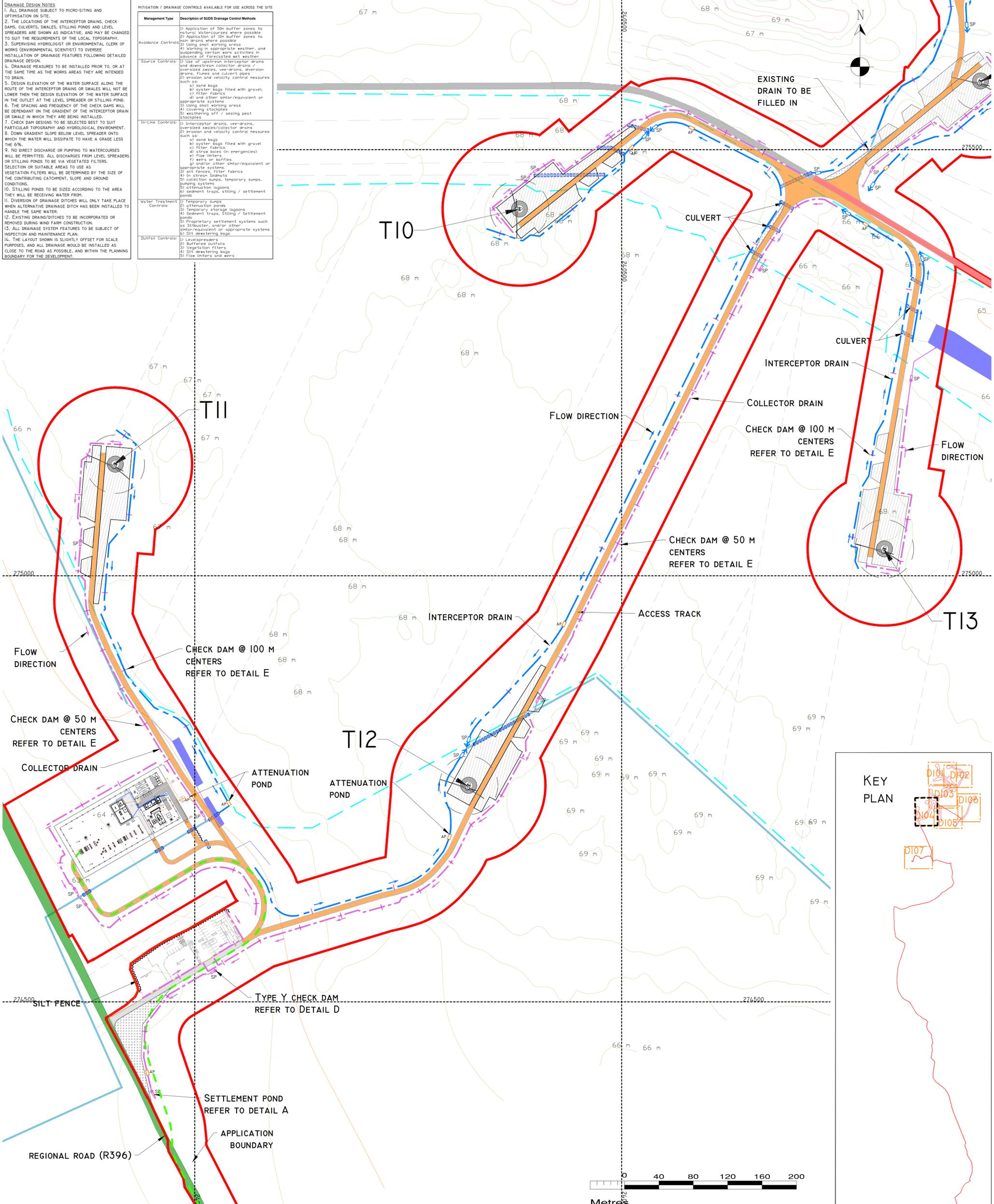


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Revisions			
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Client:	MKO		
Job:	COOLE WF, CO. WESTMEATH		
Title:	DRAINAGE LAYOUT SHEET 3 OF 7		
Figure No:	D103		
Drawing No:	P1320-2-0221-A1-D103-00A		
Sheet Size:	A1	Project No.:	P1320-2
Scale:	1:2,000 (A1)	Drawn By:	MG/GD
Date:	17/02/2021	Checked By:	MG

DRAINAGE DESIGN NOTES

1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMIZATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, STILLING PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THAN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR STILLING POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISSIPATE TO HAVE A GRADE LESS THAN 6%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS.
10. VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
11. STILLING PONDS TO BE SIZED ACCORDING TO THE AREA THEY WILL BE RECEIVING WATER FROM.
12. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
13. EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
14. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
15. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WOULD BE INSTALLED AS CLOSE TO THE ROAD AS POSSIBLE, AND WITHIN THE PLANNING BOUNDARY FOR THE DEVELOPMENT.

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural watercourses where possible 2) Application of 10m buffer zones to drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) syster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing peat stockpiles
In-Line Controls	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) syster bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) weirs or baffles f) and/or other similar/equivalent or appropriate systems 3) In stream Sednets 4) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stiling / settlement ponds
Water Treatment Controls	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stiling / Settlement ponds 5) Proprietary settlement systems such as Settlers, and/or other similar/equivalent or appropriate systems 6) Silt settling bags
Outfall Controls	1) Level spreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt settling bags 5) Flow limiters and weirs



DRAWING LEGEND	
	UPSTREAM INTERCEPTOR DITCHES
	DIRECTION OF FLOW
	DOWNSTREAM COLLECTOR DITCHES
	SETTLEMENT POND (SP)
	ATTENUATION POND (AP)
	CULVERT
	SILT FENCE (SF)
	HEADLAND DRAIN
	FIELD DRAIN
	CR - NEW STREAM/RIVER CROSSING LOCATION
	CLEAR SPAN BRIDGE
	EXISTING SETTLEMENT POND
	APPLICATION BOUNDARY
	EXISTING GROUND SURFACE MAJOR CONTOUR (5 M INTERVAL)
	EXISTING GROUND SURFACE MINOR CONTOUR (1 M INTERVAL)
	RIVERS/STREAMS
	LAKES
	NATURAL RIVERS/STREAMS 50M BUFFER
	DRAIN 10M BUFFER
	LAKE 50M BUFFER
	TURBINE AND SWEEP AREA
	TURBINE FOUNDATION
	REGIONAL ROAD
	LOCAL ROAD
	PROPOSED ROAD
	INTERNAL EXISTING ROAD TO BE UPGRADED
	EXTERNAL EXISTING ROAD TO BE UPGRADED
	PASSING BAY
	CRANE PLATFORM
	BORROW PIT

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4. ALL DIMENSIONS ARE IN METRES.

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Revisions

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web: www.hydroenvironmental.ie

Client: **MKO**

Job: **COOLE WF, CO. WESTMEATH**

Title: **DRAINAGE LAYOUT SHEET 4 OF 7**

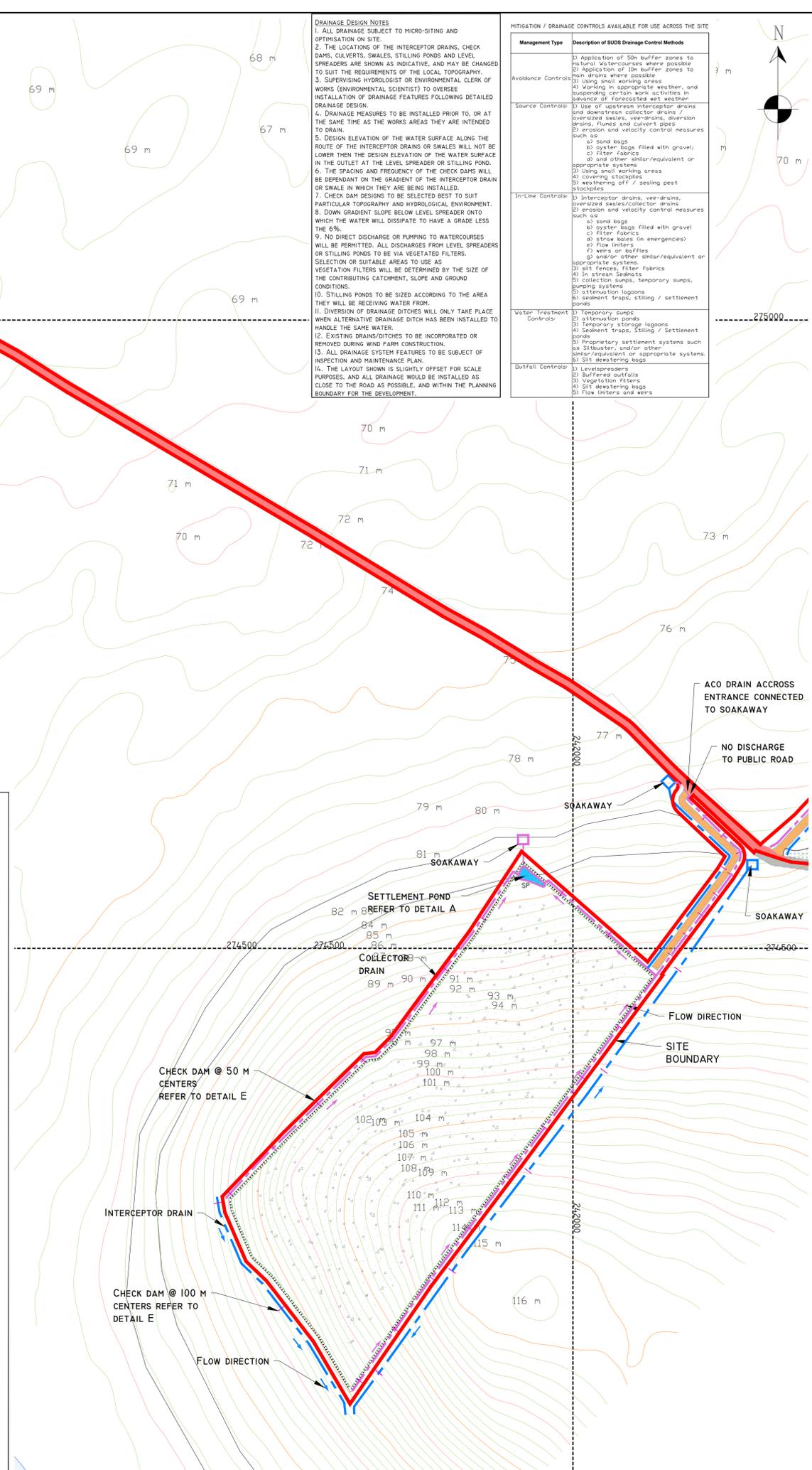
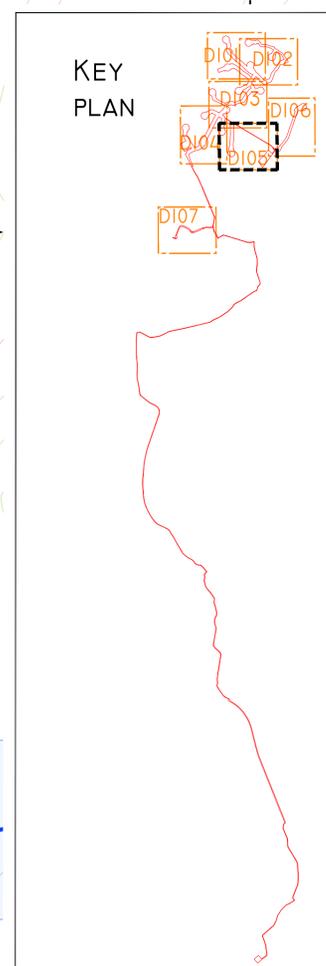
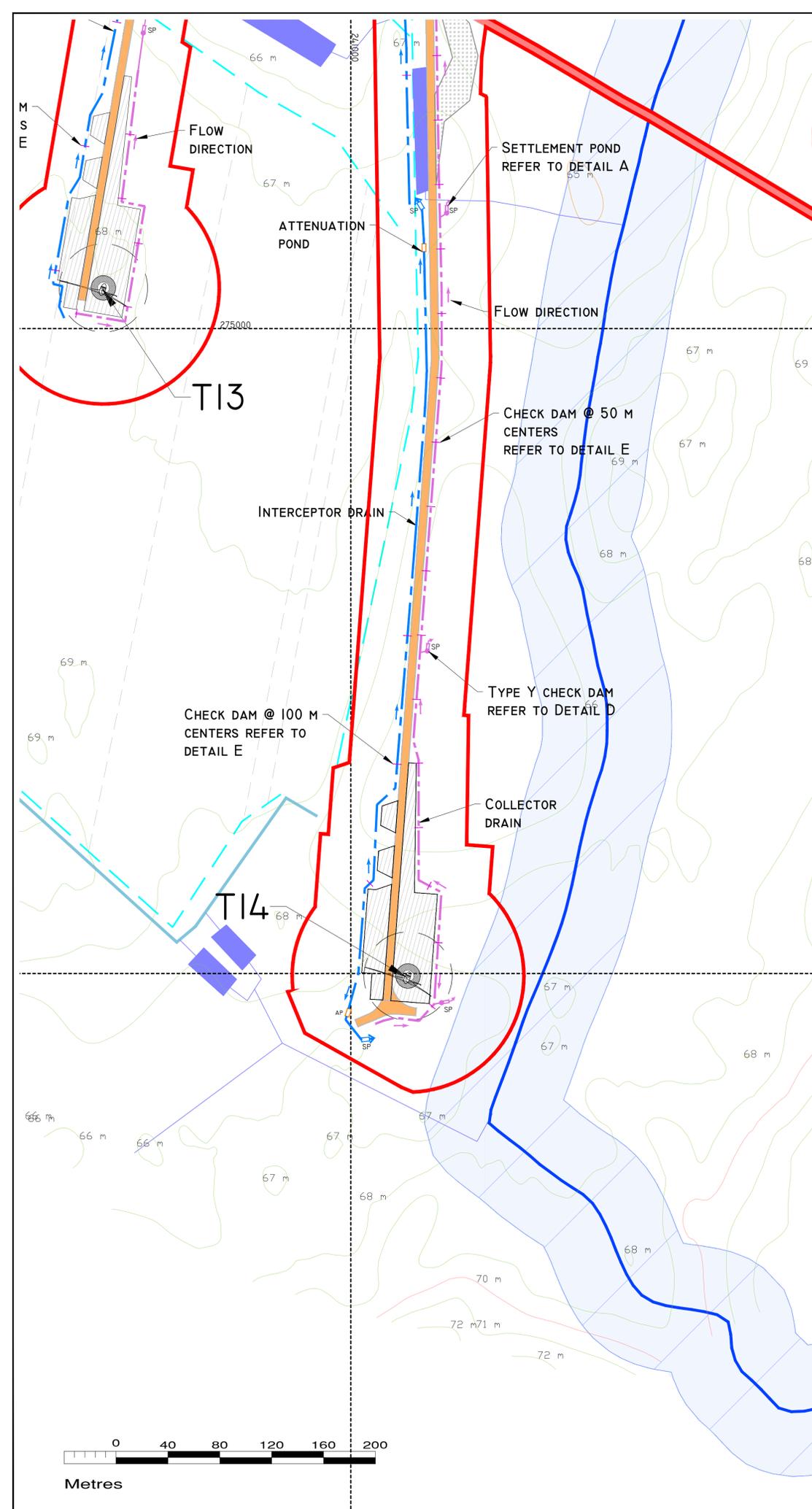
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Sheet Size: A1 Project No.: P1320-2

Scale: 1:2,000 (A1) Drawn By: MG/GD

Date: 17/02/2021 Checked By: MG



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Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural watercourses where possible 2) Application of 10m buffer zones to rain drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) silt fences filled with gravel c) filter fabrics d) straw bales (on emergencies) e) flow letters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing pest stockpiles
In-Line Controls	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) silt fences filled with gravel c) filter fabrics d) straw bales (on emergencies) e) flow letters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems 3) silt fences, filter fabrics 4) In stream Sedmats 5) collection sumps, temporary sumps, pumping systems 6) attenuation lagoons 7) sediment traps, stiling / settlement ponds
Water Treatment Controls	1) Temporary sumps 2) attenuation ponds 3) silt fences, filter fabrics 4) Sediment traps, Stiling / Settlement ponds 5) Proprietary settlement systems such as siltcatchers, and/or other similar/equivalent or appropriate systems 6) Silt dewatering bags 7) Silt dewatering bags 8) Flow letters and weirs
Buttress Controls	1) Level spreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt dewatering bags 5) Flow letters and weirs

DRAWING LEGEND :

- UPSTREAM INTERCEPTOR DITCHES
- DIRECTION OF FLOW
- DOWNSTREAM COLLECTOR DITCHES
- SETTLEMENT POND (SP)
- ATTENUATION POND (AP)
- CULVERT
- SILT FENCE (SF)
- HEADLAND DRAIN
- FIELD DRAIN
- CR - NEW STREAM/RIVER
- CROSSING LOCATION
- CLEAR SPAN BRIDGE
- EXISTING SETTLEMENT POND

- APPLICATION BOUNDARY
- EXISTING GROUND SURFACE MAJOUR CONTOUR (5 M INTERVAL)
- EXISTING GROUND SURFACE MINOR CONTOUR (1 M INTERVAL)
- RIVERS/STREAMS
- LAKES
- NATURAL RIVERS/STREAMS 50M BUFFER
- DRAIN 10M BUFFER
- LAKE 50M BUFFER
- TURBINE AND SWEEP AREA
- TURBINE FOUNDATION
- REGIONAL ROAD
- LOCAL ROAD
- PROPOSED ROAD
- INTERNAL EXISTING ROAD TO BE UPGRADED
- EXTERNAL EXISTING ROAD TO BE UPGRADED
- PASSING BAY
- CRANE PLATFORM
- BORROW PIT

PROJECT DESIGN DRAWING NOTES

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7. LAYOUT PLANS SHOW TYPICAL TURBINE ROTOR DIAMETER AS PER TURBINE DRAWING.

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Date	Description	Chkd	Signed
Revisions			

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Client: **MKO**

Job: **COOLE WF, CO. WESTMEATH**

Title: **DRAINAGE LAYOUT SHEET 5 OF 7**

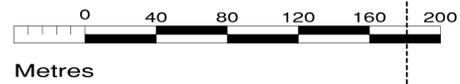
Figure No: **D105**

Drawing No: P1320-2-0221-A1-D105-00A

Sheet Size: A1 Project No.: P1320-2

Scale: 1:2,000 (A1) Drawn By: MG/GD

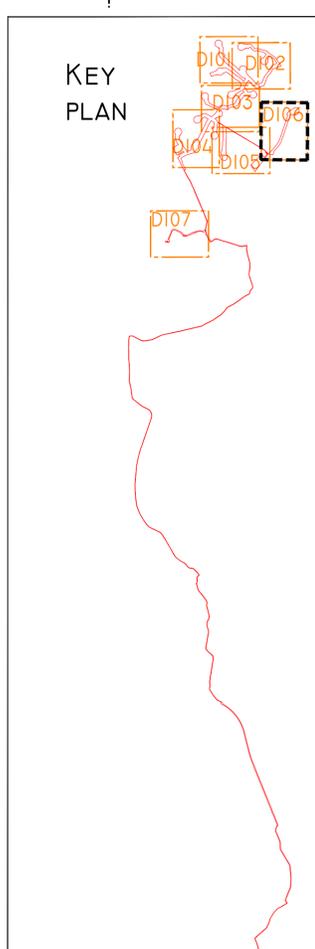
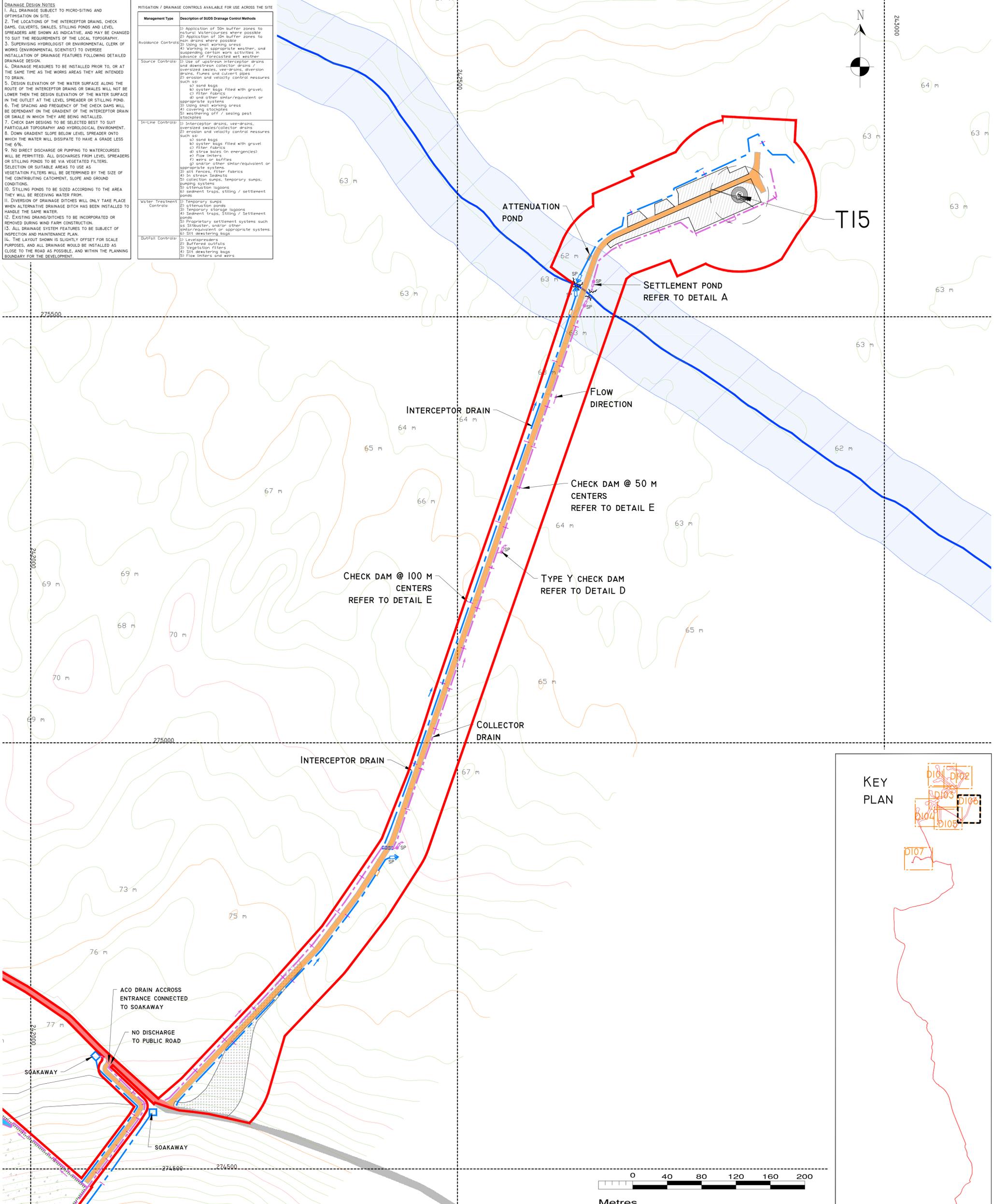
Date: 17/02/2021 Checked By: MG



DRAINAGE DESIGN NOTES

1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMIZATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, STILLING PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THAN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR STILLING POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISSIPATE TO HAVE A GRADE LESS THAN 6%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS.
10. VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
11. STILLING PONDS TO BE SIZED ACCORDING TO THE AREA THEY WILL BE RECEIVING WATER FROM.
12. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
13. EXISTING DRAINAGE DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
14. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
15. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WOULD BE INSTALLED AS CLOSE TO THE ROAD AS POSSIBLE, AND WITHIN THE PLANNING BOUNDARY FOR THE DEVELOPMENT.

Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural watercourses where possible 2) Application of 10m buffer zones to sun drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) syster bags filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing peat stockpiles
In-Line Controls	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) syster bags filled with gravel c) filter fabrics d) straw bales (in emergencies) e) flow limiters f) weirs or baffles g) and/or other similar/equivalent or appropriate systems 3) silt fences, filter fabrics 4) In stream Sednats 5) collection sumps, temporary sumps, pumping systems 6) attenuation lagoons 7) sediment traps, settling / settlement ponds
Water Treatment Controls	1) Temporary sumps 2) attenuation ponds 3) Temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Siltstrainers, and/or other similar/equivalent or appropriate systems 6) Silt de-watering bags
Outfall Controls	1) Level spreaders 2) Buffered outfalls 3) Vegetation filters 4) Silt de-watering bags 5) Flow limiters and weirs



DRAWING LEGEND	
	UPSTREAM INTERCEPTOR DITCHES
	DIRECTION OF FLOW
	DOWNSTREAM COLLECTOR DITCHES
	SETTLEMENT POND (SP)
	ATTENUATION POND (AP)
	CULVERT
	SILT FENCE (SF)
	HEADLAND DRAIN
	FIELD DRAIN
	CR - NEW STREAM/RIVER CROSSING LOCATION
	CLEAR SPAN BRIDGE
	EXISTING SETTLEMENT POND
	APPLICATION BOUNDARY
	EXISTING GROUND SURFACE MAJOR CONTOUR (5 M INTERVAL)
	EXISTING GROUND SURFACE MINOR CONTOUR (1 M INTERVAL)
	RIVERS/STREAMS
	LAKES
	NATURAL RIVERS/STREAMS 50M BUFFER
	DRAIN 10M BUFFER
	LAKE 50M BUFFER
	TURBINE AND SWEEP AREA
	TURBINE FOUNDATION
	REGIONAL ROAD
	LOCAL ROAD
	PROPOSED ROAD
	INTERNAL EXISTING ROAD TO BE UPGRADED
	EXTERNAL EXISTING ROAD TO BE UPGRADED
	PASSING BAY
	CRANE PLATFORM
	BORROW PIT

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4. ALL DIMENSIONS ARE IN METRES.

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Date	Description	Chkd	Signed

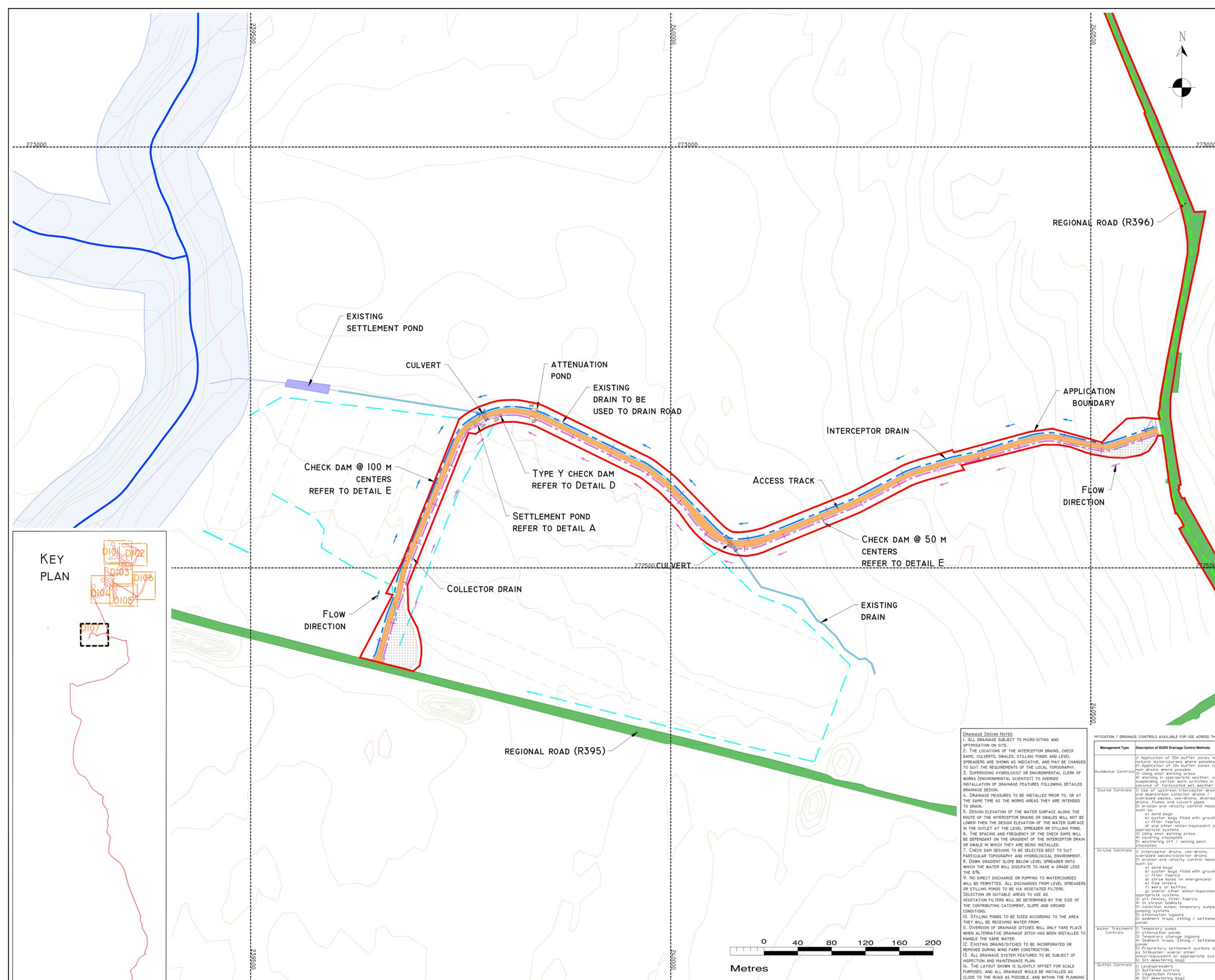
Revisions

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Client:	MKO
Job:	COOLE WF, CO. WESTMEATH
Title:	DRAINAGE LAYOUT SHEET 6 OF 7
Figure No:	D106
Drawing No:	P1320-2-0221-A1-D106-00A
Sheet Size:	A1
Project No.:	P1320-2
Scale:	1:2,000 (A1)
Drawn By:	MG/GD
Date:	17/02/2021
Checked By:	MG



- DRAWING LEGEND :**
- UPSTREAM INTERCEPTOR DITCHES
 - DIRECTION OF FLOW
 - DOWNSTREAM COLLECTOR DITCHES
 - SETTLEMENT POND (SP)
 - ATTENUATION POND (AP)
 - CULVERT
 - SILT FENCE (SF)
 - HEADLAND DRAIN
 - FIELD DRAIN
 - CR - NEW STREAM/RIVER
 - CROSSING LOCATION
 - CLEAR SPAN BRIDGE
 - EXISTING SETTLEMENT POND

- APPLICATION BOUNDARY
- EXISTING GROUND SURFACE MAJOUR CONTOUR (5 M INTERVAL)
- EXISTING GROUND SURFACE MINOR CONTOUR (1 M INTERVAL)
- RIVERS/STREAMS
- LAKES
- NATURAL RIVERS/STREAMS 50M BUFFER
- DRAIN 10M BUFFER
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7. LAYOUT PLANS SHOW TYPICAL TURBINE ROTOR DIAMETER AS PER TURBINE DRAWING.

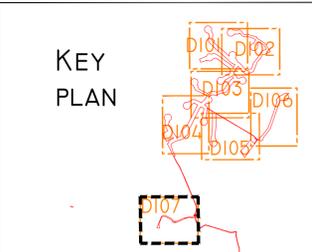
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Revisions			

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 web: www.hydroenvironmental.ie

Client:	MKO
Job:	COOLE WF, CO. WESTMEATH
Title:	DRAINAGE LAYOUT SHEET 7 OF 7
Figure No:	D107
Drawing No:	P1320-2-0221-A1-D107-00A
Sheet Size:	A1
Project No.:	P1320-2
Scale:	1:2,000 (A1)
Drawn By:	MG/GD
Date:	17/02/2021
Checked By:	MG

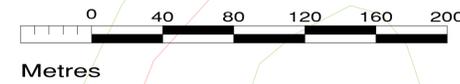


DRAINAGE DESIGN NOTES

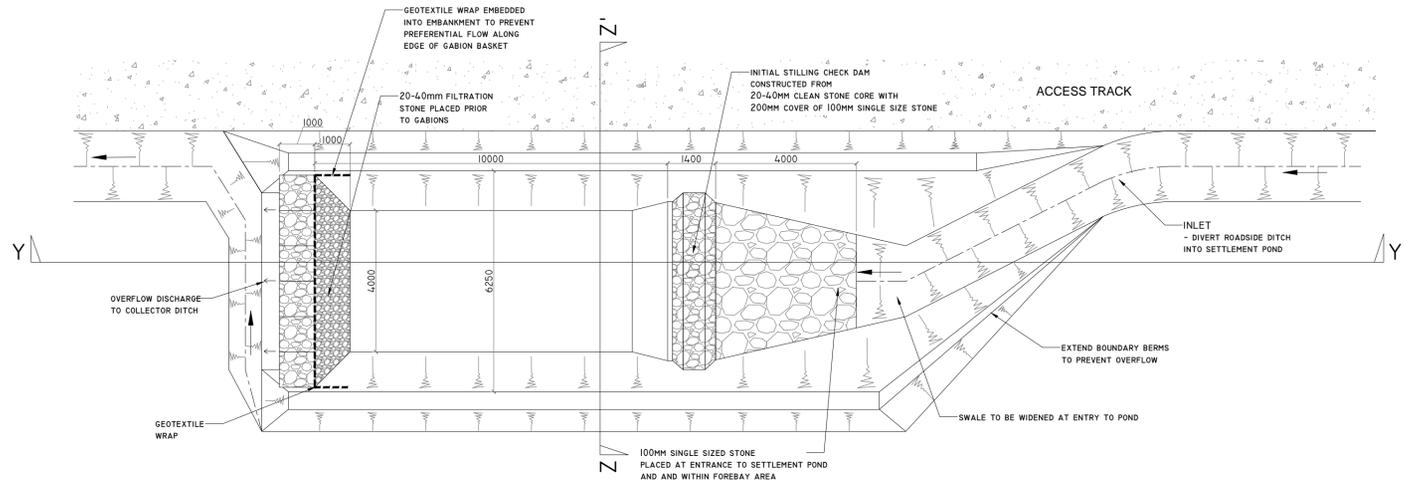
1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMISATION ON SITE.
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4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THAN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR STILLING POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISSIPATE TO HAVE A GRADE LESS THAN 6%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OF SUITABLE AREAS TO USE AS VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
10. STILLING PONDS TO BE SIZED ACCORDING TO THE AREA THEY WILL BE RECEIVING WATER FROM.
11. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
12. EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
13. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
14. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WOULD BE INSTALLED AS CLOSE TO THE ROAD AS POSSIBLE, AND WITHIN THE PLANNING BOUNDARY FOR THE DEVELOPMENT.

MITIGATION / DRAINAGE CONTROLS AVAILABLE FOR USE ACROSS THE SITE

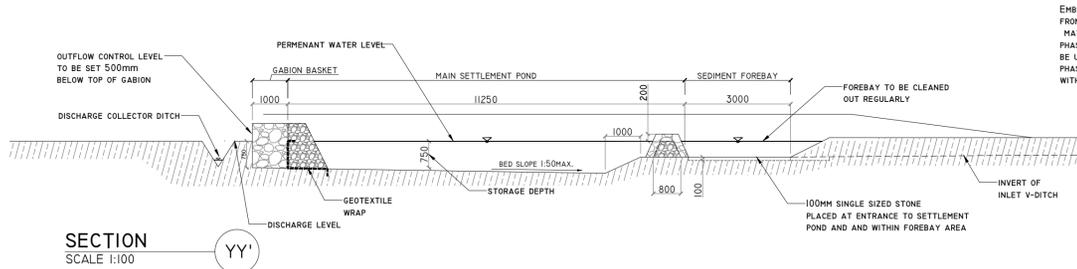
Management Type	Description of SUDS Drainage Control Methods
Avoidance Controls	1) Application of 50m buffer zones to natural watercourses where possible 2) Application of 10m buffer zones to main drains where possible 3) Using small working areas 4) Working in appropriate weather, and suspending certain work activities in advance of forecasted wet weather
Source Controls	1) Use of upstream interceptor drains and downstream collector drains / oversized swales, vee-drains, diversion drains, flumes and culvert pipes 2) erosion and velocity control measures such as: a) sand bags b) silt fences filled with gravel c) filter fabrics d) and other similar/equivalent or appropriate systems 3) Using small working areas 4) covering stockpiles 5) weathering off / sealing pest stockpiles
In-Line Controls	1) Interceptor drains, vee-drains, oversized swales/collector drains 2) erosion and velocity control measures such as: a) sand bags b) silt fences filled with gravel c) filter fabrics d) straw rolls (in emergencies) e) flow limiters f) weirs or baffles g) silt fences, filter fabrics or appropriate systems 3) In stream Sediments 4) collection sumps, temporary sumps, pumping systems 5) attenuation lagoons 6) sediment traps, stilling / settlement ponds
Water Treatment Controls	1) Temporary sumps 2) attenuation ponds 3) temporary storage lagoons 4) Sediment traps, Stilling / Settlement ponds 5) Proprietary settlement systems such as Silttraps, and/or other similar/equivalent or appropriate systems. 6) Silt de-watering bags
Driftail Controls	1) Levelspreaders 2) Bufferbed outfalls 3) Vegetation filters 4) Silt de-watering bags 5) Flow limiters and weirs



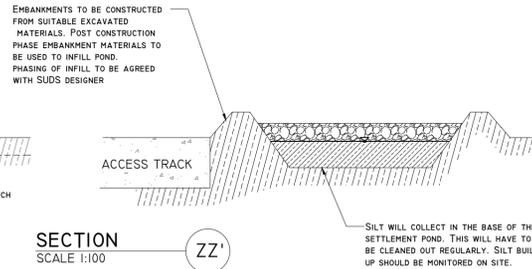
DETAIL A



TYPICAL ROAD SIDE SETTLEMENT POND DETAIL
SCALE 1:200 (NOTE DIMENSIONS VARY DEPENDING ON CATCHMENT SIZE)



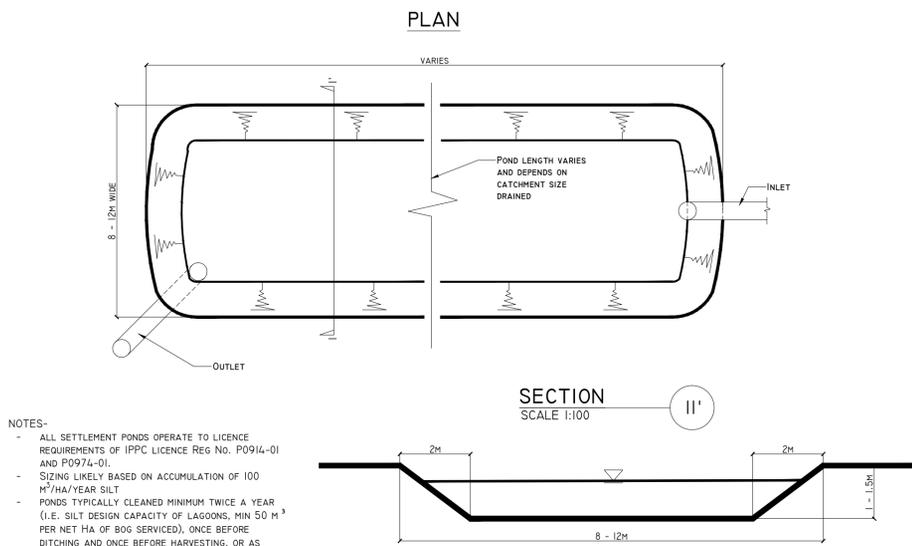
SECTION YY'
SCALE 1:100



SECTION ZZ'
SCALE 1:100

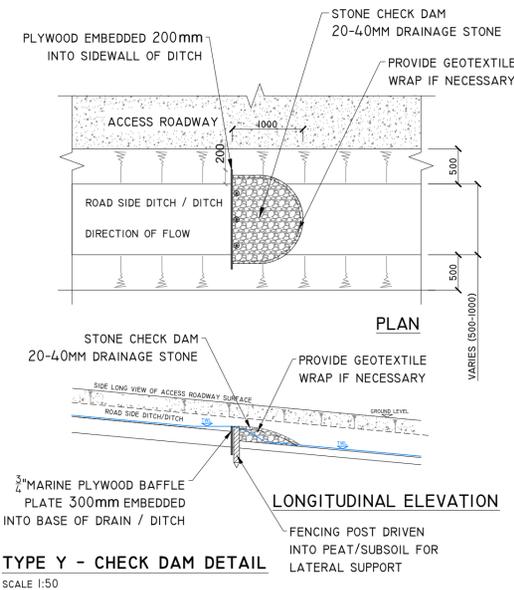
DETAIL C

TYPICAL PEATLAND SITE SETTLEMENT POND DETAIL
SCALE 1:200



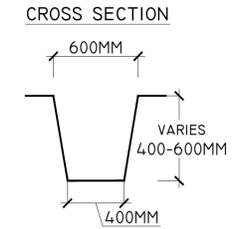
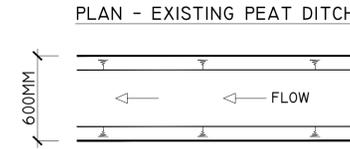
- NOTES-**
- ALL SETTLEMENT PONDS OPERATE TO LICENCE REQUIREMENTS OF IPPC LICENCE REG NO. P0914-01 AND P0974-01.
 - SIZING LIKELY BASED ON ACCUMULATION OF 100 M³/HA/YEAR SILT
 - PONDS TYPICALLY CLEANED MINIMUM TWICE A YEAR (I.E. SILT DESIGN CAPACITY OF LAGOONS, MIN 50 M³ PER NET HA OF BOG SERVICED), ONCE BEFORE DITCHING AND ONCE BEFORE HARVESTING, OR AS INSPECTIONS MAY DICTATE
 - GENERALLY - 8 - 12 M WIDE, AND 1 - 1.5 M DEEP
 - LIKELY VELOCITY THRESHOLD OF 0.1 M/SEC

DETAIL D

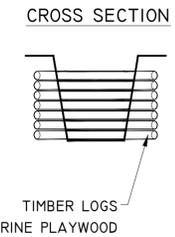
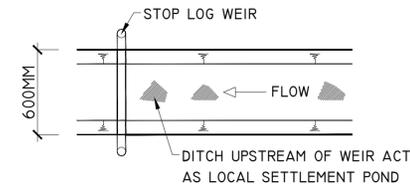


DETAIL B

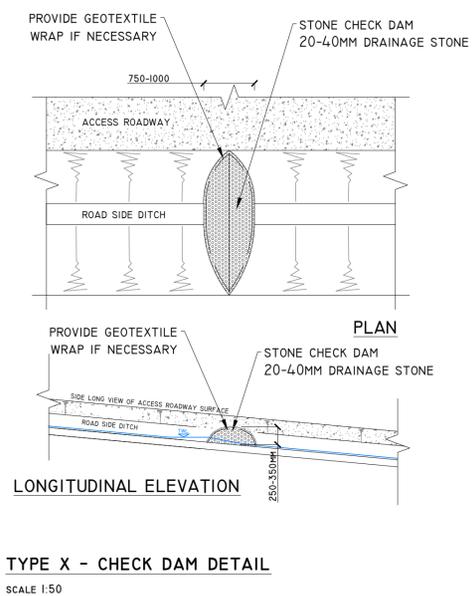
PEAT DITCH SILT TRAP
SCALE 1:25



PLAN - PEAT DITCH SILT TRAP



DETAIL E



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6. THE USE OF OR RELIANCE UPON THIS DRAWING SHALL BE DEEMED TO BE ACCEPTANCE OF THESE CONDITIONS OF USE UNLESS OTHERWISE AGREED IN WRITING. SUCH WRITTEN AGREEMENT TO BE SOUGHT FROM AND ISSUED BY THE COPYRIGHT HOLDER TO THE USER OR RELIANCE UPON THIS DRAWING.
7. DRAINAGE SYSTEMS ARE OFFSET AT A DISTANCE APPROPRIATE TO THE SCALE OF THIS DRAWING. ALL DRAINAGE WILL BE LOCATED ADJACENT TO INFRASTRUCTURE, AS APPROPRIATE ACROSS THE SITE.

DRAINAGE DESIGN NOTES

1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMISATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, SETTLEMENT PONDS AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS AREAS THEY ARE INTENDED TO DRAIN.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THAN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR SETTLEMENT POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISAPATE TO HAVE A GRADE 0.5%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OF SUITABLE AREAS TO USE AS VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
10. SETTLEMENT PONDS TO BE SIZED ACCORDING TO THE CATCHMENT AREA THEY WILL BE RECEIVING WATER FROM.
11. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
12. EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
13. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
14. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WILL BE INSTALLED AS CLOSE TO ACCESS TRACKS/ROADS AS POSSIBLE.

08.02.21	Planning - Rev A	M.G.	M.Gill
Date	Description	Chkd	Signed

HYDRO ENVIRONMENTAL SERVICES

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Client: **MKO**

Job: **COOLE WF, CO. WESTMEATH**

Title: **DRAINAGE DETAILS I**

Figure No: **501**

Drawing No: **P1320-2-0221-A1-501-00A**

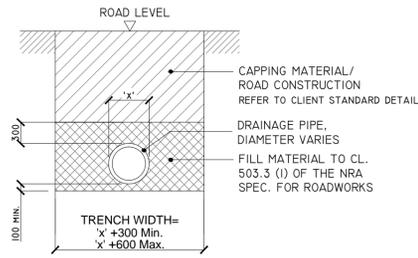
Sheet Size: **A1** Project No.: **P1320-2**

Scale: **as shown (A1)** Drawn By: **M.Gill**

Date: **17/02/2021** Checked By: **M.G.**

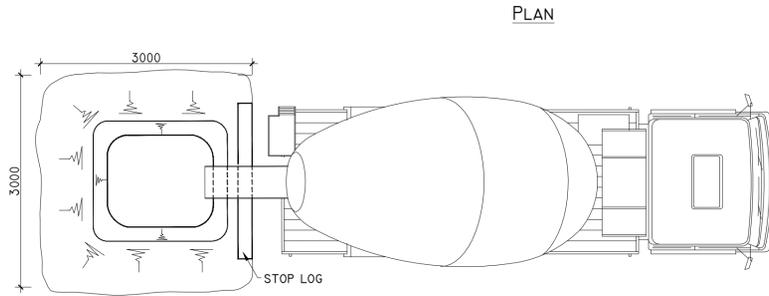
DETAIL F

'TYPE B' CULVERT - DRAINAGE CROSSING BENEATH EXCAVATED ROAD
SCALE 1:50

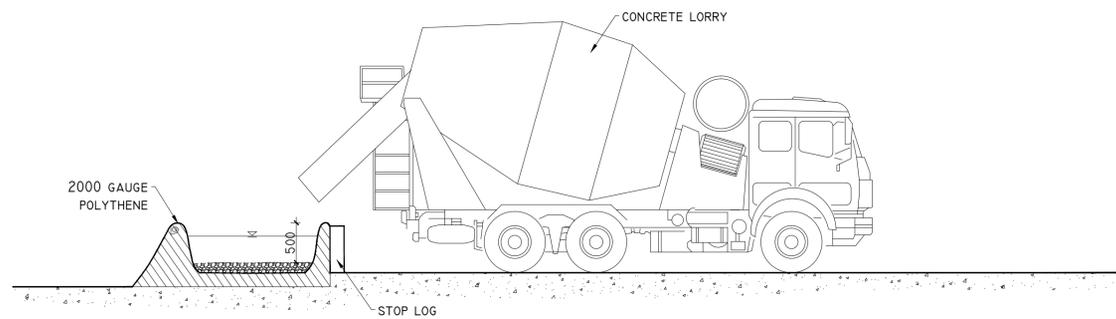


DETAIL I

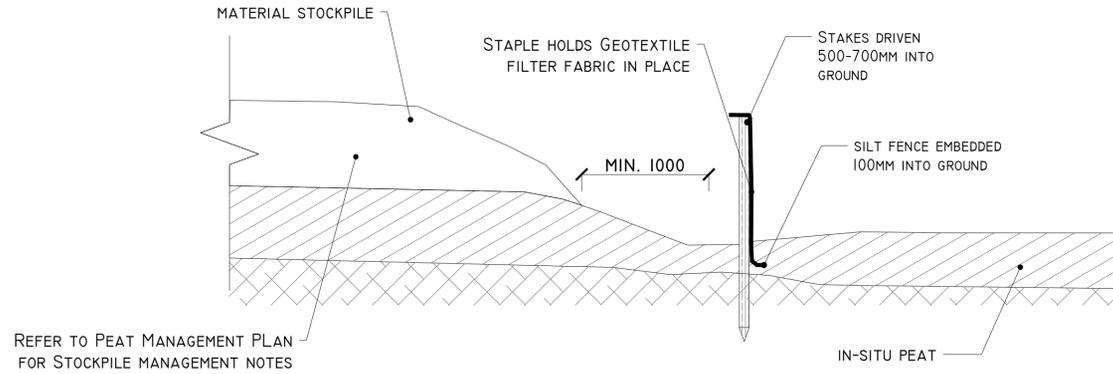
TEMPORARY CONCRETE WASH OUT PIT
SCALE 1:25



ELEVATION

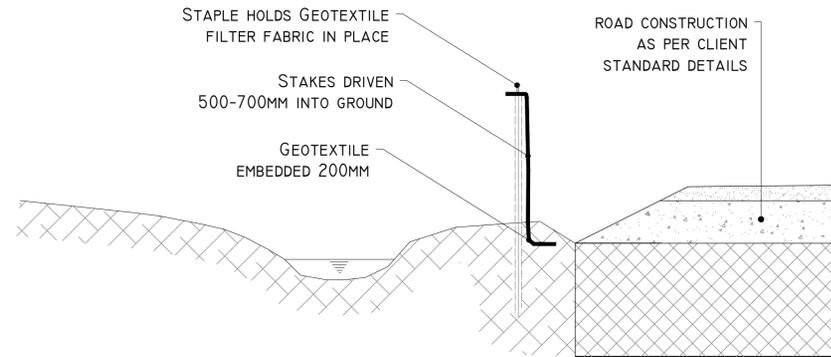


DETAIL G-I



SILT FENCE
SCALE 1:25

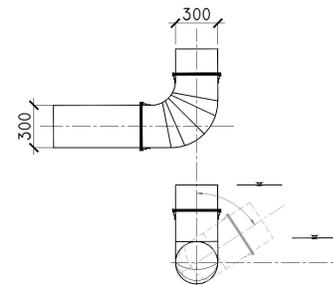
DETAIL G-II



SILT FENCE FOR WATERCOURSE PROTECTION
SCALE 1:25

DETAIL H

90° U BEND AND WATER LEVEL CONTROL MECHANISM
SCALE 1:25



PROJECT DESIGN DRAWING NOTES.
1. DRAWINGS ISSUED ARE FOR PLANNING APPLICATION PURPOSES ONLY. PLEASE NOTE THIS DRAWING IS FOR PLANNING PURPOSES ONLY, AND FURTHER DETAILED SPECIFICATION WILL BE REQUIRED FOR THE COMPLETION OF THE WORKS TO ENSURE THEY MEET REQUIRED DESIGN STANDARDS, AND PLANNING CONDITIONS.
2. DRAWINGS NOT TO BE USED FOR CONSTRUCTION /CONTRACT CONDITIONS.
3. COPYRIGHT, ALL RIGHTS RESERVED. NO PART HERE WITH MAY BE COPIED OR REPRODUCED PARTIALLY OR WHOLLY IN ANY FORM WHATSOEVER WITHOUT THE PRIOR NOTICE OF THE COPYRIGHT OWNER HYDRO-ENVIRONMENTAL SERVICES.
4. DO NOT SCALE OFF THIS DRAWING. FIGURED METRIC DIMENSIONS ONLY SHOULD BE TAKEN OFF THIS DRAWING.
5. ALL CONTRACTORS, WHETHER MAIN OR SUB-CONTRACTORS, MUST VISIT THE SITE AND ARE RESPONSIBLE FOR TAKING AND CHECKING ANY AND ALL DIMENSIONS AND LEVELS THAT RELATE TO THE WORKS.
6. THE USE OF OR RELIANCE UPON THIS DRAWING SHALL BE DEEMED TO BE ACCEPTANCE OF THESE CONDITIONS OF USE UNLESS OTHERWISE AGREED IN WRITING, SUCH WRITTEN AGREEMENT TO BE SOUGHT FROM AND ISSUED BY THE COPYRIGHT HOLDER TO THE USE OR RELIANCE UPON THIS DRAWING.
7. DRAINAGE SYSTEMS ARE OFFSET AT A DISTANCE APPROPRIATE TO THE SCALE OF THIS DRAWING. ALL DRAINAGE WILL BE LOCATED ADJACENT TO INFRASTRUCTURE, AS APPROPRIATE ACROSS THE SITE.

DRAINAGE DESIGN NOTES
1. ALL DRAINAGE SUBJECT TO MICRO-SITING AND OPTIMISATION ON SITE.
2. THE LOCATIONS OF THE INTERCEPTOR DRAINS, CHECK DAMS, CULVERTS, SWALES, SETTLEMENT POND AND LEVEL SPREADERS ARE SHOWN AS INDICATIVE, AND MAY BE CHANGED TO SUIT THE REQUIREMENTS OF THE LOCAL TOPOGRAPHY.
3. SUPERVISING HYDROLOGIST OR ENVIRONMENTAL CLERK OF WORKS (ENVIRONMENTAL SCIENTIST) TO OVERSEE INSTALLATION OF DRAINAGE FEATURES FOLLOWING DETAILED DRAINAGE DESIGN.
4. DRAINAGE MEASURES TO BE INSTALLED PRIOR TO, OR AT THE SAME TIME AS THE WORKS ARE INTENDED TO BE INSTALLED.
5. DESIGN ELEVATION OF THE WATER SURFACE ALONG THE ROUTE OF THE INTERCEPTOR DRAINS OR SWALES WILL NOT BE LOWER THAN THE DESIGN ELEVATION OF THE WATER SURFACE IN THE OUTLET AT THE LEVEL SPREADER OR SETTLEMENT POND.
6. THE SPACING AND FREQUENCY OF THE CHECK DAMS WILL BE DEPENDANT ON THE GRADIENT OF THE INTERCEPTOR DRAIN OR SWALE IN WHICH THEY ARE BEING INSTALLED.
7. CHECK DAM DESIGNS TO BE SELECTED BEST TO SUIT PARTICULAR TOPOGRAPHY AND HYDROLOGICAL ENVIRONMENT.
8. DOWN GRADIENT SLOPE BELOW LEVEL SPREADER ONTO WHICH THE WATER WILL DISPERSE TO HAVE A GRADE 45%.
9. NO DIRECT DISCHARGE OR PUMPING TO WATERCOURSES WILL BE PERMITTED. ALL DISCHARGES FROM LEVEL SPREADERS OR STILLING PONDS TO BE VIA VEGETATED FILTERS. SELECTION OF SUITABLE AREAS TO USE AS VEGETATION FILTERS WILL BE DETERMINED BY THE SIZE OF THE CONTRIBUTING CATCHMENT, SLOPE AND GROUND CONDITIONS.
10. SETTLEMENT POND TO BE SIZED ACCORDING TO THE CATCHMENT AREA THEY WILL BE RECEIVING WATER FROM.
11. DIVERSION OF DRAINAGE DITCHES WILL ONLY TAKE PLACE WHEN ALTERNATIVE DRAINAGE DITCH HAS BEEN INSTALLED TO HANDLE THE SAME WATER.
12. EXISTING DRAINS/DITCHES TO BE INCORPORATED OR REMOVED DURING WIND FARM CONSTRUCTION.
13. ALL DRAINAGE SYSTEM FEATURES TO BE SUBJECT OF INSPECTION AND MAINTENANCE PLAN.
14. THE LAYOUT SHOWN IS SLIGHTLY OFFSET FOR SCALE PURPOSES, AND ALL DRAINAGE WILL BE INSTALLED AS CLOSE TO ACCESS TRACKS/ROADS AS POSSIBLE.

08.02.21	Planning - Rev A	M.G.	M.Gill
Date	Description	Chkd	Signed
Revisions			

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Client: MKO

Job: COLLE WF, Co. WESTMEATH

Title: DRAINAGE DETAILS 2

Figure No: 502

Drawing No: P1320-2-0221-A1-502-00A

Sheet Size: A1 Project No.: P1320-2
Scale: as shown (A1) Drawn By: M.Gill
Date: 17/02/21 Checked By: M.G.